

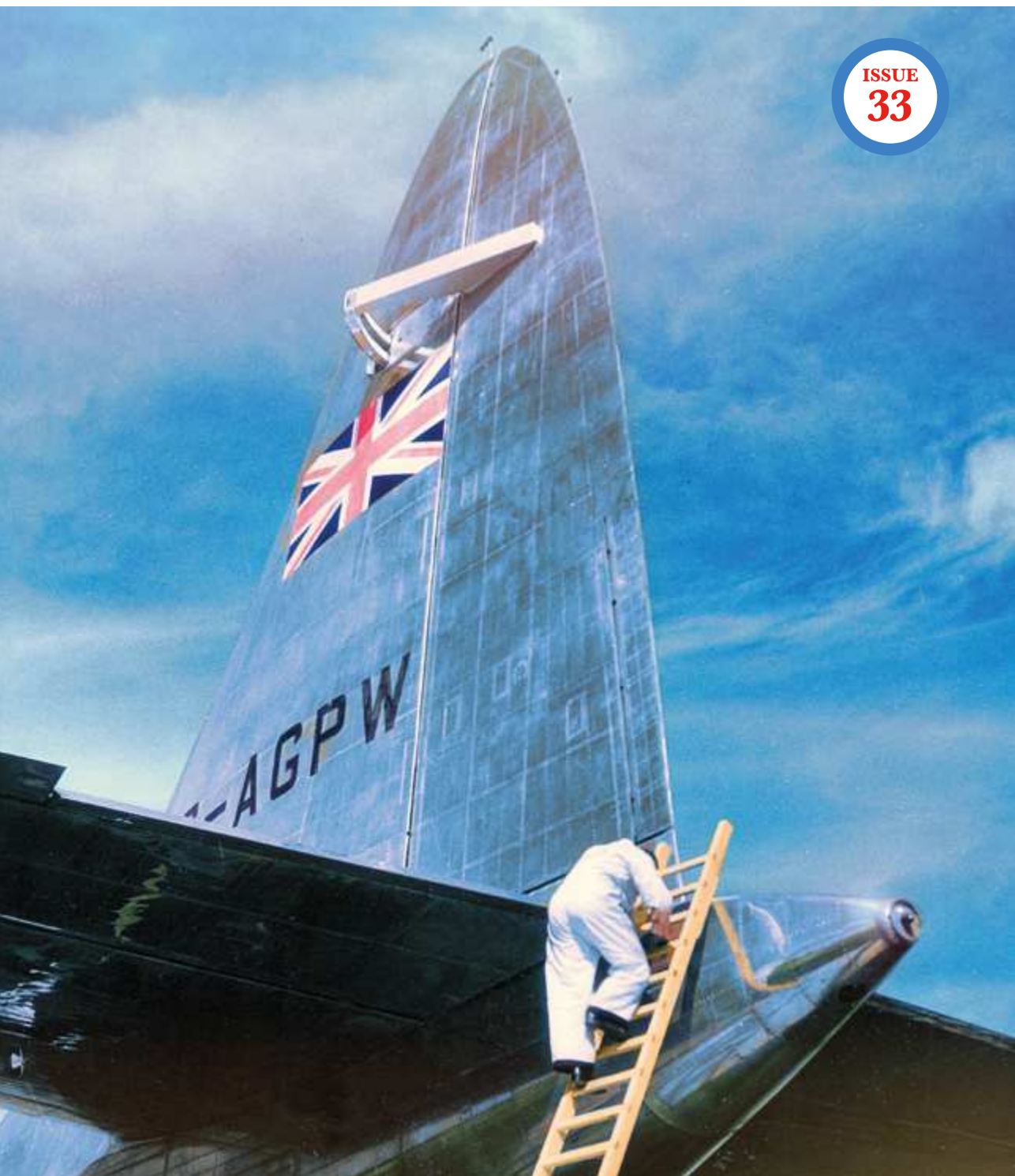
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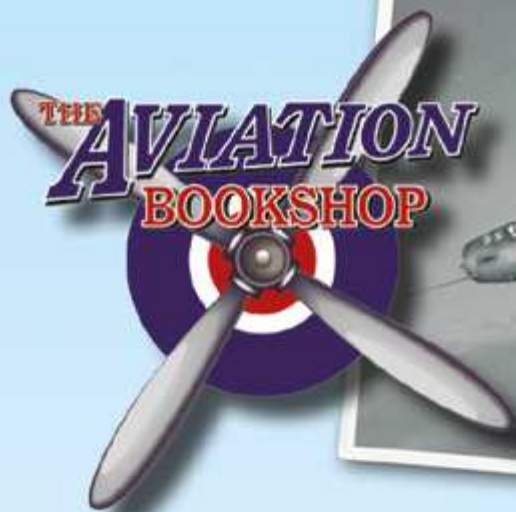
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## A VERY BRITISH TALE

75 YEARS ON — THE BRABAZON COMMITTEE

ISSUE  
33





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# The Aviation Historian®

The modern journal of classic aeroplanes and the history of flying

## Editor's Letter

75 YEARS AGO, in December 1945, Lord Brabazon of Tara delivered the last of his reports based on the work of his Committee, originally convened in late 1942 to examine the prospects for the UK's post-war civil aviation industry. Intended to prepare the soil in which to plant post-war flags of prosperity for Britain and its Dominions, the Brabazon Committee's recommendations were largely prescient and well-conceived from a technical and operational standpoint, but the political methodology required to put them into action was too complex, and the industrial base too diverse and sedentary to implement them at the pace required to grasp the lead envisioned by the Committee. In this issue, using contemporary official sources, Professor Keith Hayward examines the political and industrial aspects of the Committee's work, to be followed in *TAH34* by Ralph Pegram's analysis of BOAC's frustrated relationship with the Committee and the proposed hardware that the airline felt it needed — but didn't get. It's a classic Great British story of political muddle, industrial inertia and lost opportunities.

Although encompassing a typically wide spread of subjects, this issue definitely also has something of a French flavour. Starting on page 32 we have Jean-Christophe Carbonel describing the 1920s experiments of Jean de Chappedelaine into centrifugal force as a means of propulsion; trailing in its (optimistic) wake is Thomas Withington's exploration of the possibility of Dassault's Mirage IV as a TSR.2 replacement for the RAF in the mid-1960s; and on page 96 Albert Grandolini opens his multi-part biography of Cambodian MiG-17 and Skyraider pilot Major Su Sampong, who was posted to France to hone his fighter skills before returning to serve with the *Aviation Royale Khmère*, an air arm largely built on French military aviation principles. And that's not to mention Peru's Nieuport-Delages on pages 108–113. It was not a conscious decision to “theme” the issue, but this Gallic *saveur* hopefully lends it a certain piquancy — *bon appetit!*

**FRONT COVER** A Bristol mechanic inspects the tail of the Bristol Brabazon prototype, G-AGPW, the largest passenger landplane in the world, in September 1950. TAH ARCHIVE / COLOUR BY RICHARD JAMES MOLLOY

**BACK COVER** The romantically registered Douglas DC-6 I-LOVE joined the Linee Aeree Italiane fleet in October 1950. The final part of Maurice Wickstead's three-parter on Italy's airlines starts on p58.

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# AIR CORRESPONDENCE



## Letters to the Editor

### Don't forget Dorset

**SIR** — Greg Baughen's article *1940: The Battle of... Kent?* in *TAH32* was interesting but it is a pity that the author, like so many historians, perpetuates the myth that the Battle of Britain was confined to the Home Counties. In 1940 I lived in a house between Weymouth and Portland and I have vivid memories of the time, and of being subjected to many raids — not least witnessing on July 4 the destruction of *HMS Foylebank* by Junkers Ju 87 Stukas, during which Leading Seaman Jack Mantle, manning an AA gun, was awarded a posthumous VC.

Warmwell was a very active fighter airfield to the north-east of Weymouth and many air battles were fought over and in the vicinity of Portland Harbour. Another VC, Flight Lieutenant J.B. Nicolson, a member of No 249 Squadron, was involved in these and I have seen a painting of the action for which his VC — the only one to be awarded to Fighter Command — was earned. It depicts his aircraft over Portland Harbour, although histories say the action took place over Southampton or the New Forest. If any reader can resolve the question of its location I will be most grateful.

Should any reader doubt that Dorset was very much involved in the Battle, a study of detailed records will confirm my recollection.

**Roger Bunbury** Launceston, Cornwall

*Greg Baughen responds:*

*Dear Mr Bunbury, my most humble apologies! You are of course quite right to correct me. I most definitely should have included Dorset in the list of counties where the initial fighting was focused. Indeed, early German invasion plans included a landing in the Lyme Regis area.*

*I hope this did not detract too much from the main point of the article that German air operations were intended to prepare for an invasion, and were not an assault on the country as a whole. The focus was on the southern counties and indeed, as the battle progressed, air operations became even more focused on the very small south-east corner of the country.*

*Thanks for your comments and especially*

*the reminder of the ferocity of some of the fighting in the Dorset region and the gallantry of those involved.*

### KNILM in Timor

**SIR** — I very much enjoyed the *From Flying to Spying* articles in *TAH30* and *TAH31*. Great "completely unknown" aviation history!

Although this was not the subject of the articles, I did miss mention of the involvement of the Royal Netherlands Indies Airlines (KNILM) at (Dutch and Portuguese) Timor. Obviously, the Netherlands East Indies (NEI) colonial administration was as much concerned about the Japanese interest in Timor as the Australians were. The Portuguese, attempting to remain "neutral" in view of the ambitions of the Japanese, the Dutch and the Australians, decided to establish their own air service on Timor. On October 5, 1940, they founded the *Serviços Aereos da Colonia Portuguesa da Timor*. Probably the Dutch had been promoting this venture, because KNILM leased one of its Fokker F.VIIb-3ms (PK-AFB), with a pilot and a maintenance engineer. It was later replaced by another (PK-AFG) and a weekly service was started between (Portuguese) Dili and (Dutch) Koepang. Sometime in 1941 the Fokker was replaced by a de Havilland D.H.89 Dragon Rapide (PK-AKV).

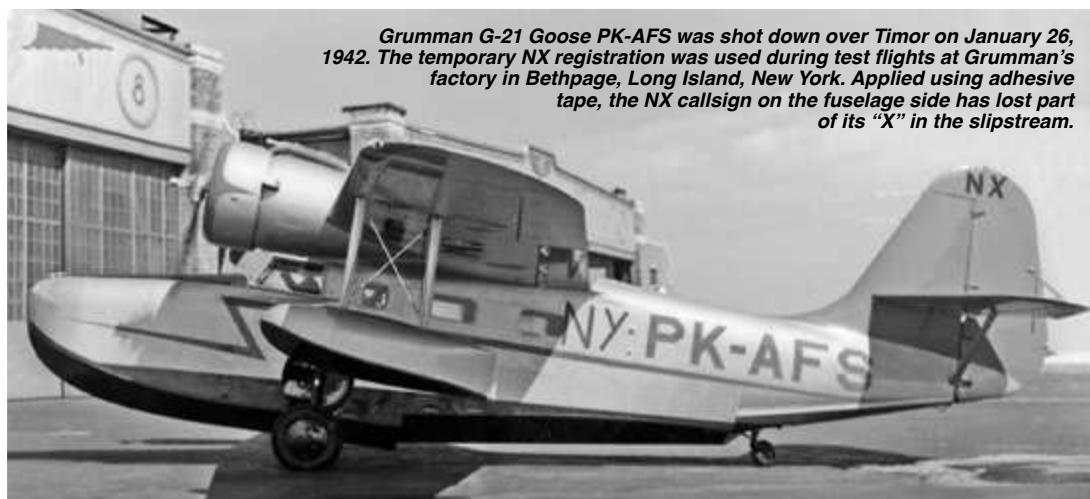
A vitally important aspect of the duties of the Dutch aircrew included keeping a very close eye on the Japanese activities on Timor. This was no doubt also a reason that KNILM kept up its flight services, in spite of the fact that, by April 1941, the Portuguese were already six months behind in their lease payments and salaries for the crew. One Dutch pilot who is mentioned in particular for his intelligence reports on Japanese activities is Wink Versteegh Jr, the son of KNILM's managing director Willem Versteegh Sr. In fact, KNILM was still operating the Timor service with the Dragon Rapide until the end of January 1942. The pilot then was Uros de Giaksa de Salvi; despite his exotic-sounding name, he was not Portuguese, but a former





**Fokker F.VIIb-3M PK-AFB of Netherlands East Indies Airline KNILM, photographed at Surabaya's Dermo Airport in October 1935. It was leased with crew to the Timor air service in 1940. Reports that it received the Portuguese registration CR-AFB have not been confirmed.**

H.K. DE GRAAF VIA G.J. CASIUS



**Grumman G-21 Goose PK-AFS was shot down over Timor on January 26, 1942. The temporary NX registration was used during test flights at Grumman's factory in Bethpage, Long Island, New York. Applied using adhesive tape, the NX callsign on the fuselage side has lost part of its "X" in the slipstream.**

GRUMMAN VIA G.J. CASIUS

Dutch Air Force NCO pilot born in Budapest.

After hostilities with Japan had begun, Portuguese Timor was occupied by a mixed Dutch and Australian force on December 17, 1941. The Dragon Rapide was now mostly used for semi-military duties such as liaison and camouflage inspections. On January 26, 1942, the Rapide was scheduled to make a camouflage check flight, but had to be reported unserviceable. Therefore a KNILM Grumman G-21 Goose (PK-AFS), which operated in the same area, flew this mission; but shortly after it took off from Koepang's Penfui airfield seven Japanese Mitsubishi Zero fighters appeared over the airfield and started to strafe the hangar, barracks and radio station. Two of the Zeros sighted the Grumman amphibian. Its KNILM

pilot Cees ten Katen tried to slip away into the cover of a ravine, but the Grumman was shot down. All five occupants were killed in the ensuing crash.

Rapide 'AKV was hit in the Penfui hangar by a shot which pierced a wing spar. The wing covering was patched up and the aircraft was declared fit for a ferry flight. Accompanied by his wife, de Giaksa de Salvi flew it to Bandung in West Java. This meant a nine-flying-hours trip with three stops. At KNILM's maintenance base at Bandung's Andir airport, it was found that one of the rudder control cables had also been hit and except for a few strands had been almost completely severed.

War is a matter of being lucky!

**Gerard Casius** *IJsselmuiden, The Netherlands*

### Finger four forerunners — 1

**SIR** — With reference to your correspondence thread on the Hurricane formation photograph (*Air Correspondence*, *TAH30*), I look forward to learning when “finger four” first appeared in *AP129 [the RAF Flying Training Manual — Ed]*. I doubt though that an amendment would have appeared soon after the formation was adopted; the RAF admin trail was unlikely to be efficient during the war, but I may be surprised. However, I can help with the second question [i.e. where the formation originated].

During the spring after the Battle of Britain Douglas Bader copied the Luftwaffe *Schwarm*, and he named it the finger four. His pilots were immediately impressed because, unlike the line-astern pattern, all pilots were always covered. By this time the vic formation had been largely abandoned and the concept of a fighting pair was widely used; this was also copied from the Luftwaffe, and it had taken a long time to relearn the doctrine of German First World War ace Oswald Boelcke. All fighter squadrons soon followed Bader’s lead.

The photograph has too little information to suggest what formation was being flown. It does seem to be more like finger four than echelon, but without knowing more a full analysis cannot be made. Yes, the nearest Hurricane should be further back for finger four; but, if it was the leader and the aim was to be in echelon, the photograph could have been taken whilst the

other three were still closing in on to the port wing, perhaps in a turn at the time. The relative experience of the pilots could explain how quickly (or otherwise) they formed up. Equally, experience might have had an effect on the ideal shape for a finger four. Without knowing more about the profile and what they were trying to do, it will remain a mystery.

Still love the journal! It gets better and better.

**Chris Roberts** Bookham, Surrey

### Finger four forerunners — 2

**SIR** — My impression was that the finger four formation (*Air Correspondence*, *TAH30*) originated during the Spanish Civil War, but then again I’ve read several books about that conflict and none on the Finnish Air Force, so that’s not a very solid foundation.

Immediately prior to picking up *TAH30*, however, I had finished reading Mike Spick’s 1983 book *Fighter Pilot Tactics* [published by Stein & Day] in which he covers the development of the Luftwaffe’s *Schwarm*, or finger four, formation. He states (p43) that as *Jagdgruppe 88* initially had only six Bf 109s, they switched from vics to *Rotten*, or pairs, as the main fighting unit in order to make better use of the limited numbers of aircraft at their disposal. Having found the loose pair a more effective fighting formation, when they received more aircraft they doubled up to make a pair of pairs — and what we now know as the finger four was born.

## FORGET 2020! Here are wall calendars for 2021 . . .

THANKS TO THE Covid-19 pandemic, most people will be very ready to wave goodbye to 2020. With just weeks to go until the new year, here are some 2021 wall calendars that will aid planning (remember that?) and provide adornment. The two large (20in x 14in, 508mm x 356mm) GHOSTS calendars, by veteran air-to-air photographer Philip Makanna, feature World War One and World War Two subjects respectively. Order them for \$15.99 + p&p apiece from website

[www.ghosts.com](http://www.ghosts.com) or GHOSTS, 665 Arkansas St, San Francisco, CA 94107, USA. The smaller one (12in x 8½in, 305mm x 216mm) is the Cross & Cockade International calendar, featuring fine paintings of World War One subjects by 12 artists. It is available for £11.50 inc p&p (UK), £12.75 Europe and £14 RoW, ordered direct from [www.crossandcockade.com](http://www.crossandcockade.com). Profits from the calendar support the upkeep of the British Air Services Memorial at St Omer in France.





## The Gyroptère as described in a 1915 newspaper article

A FLYING-MACHINE THAT is neither an aeroplane, balloon, helicopter nor ornithopter is now being tried. Called a gyropter, it is the invention of A. Papin and D. Rouilly. Its principle is taken from a study of the movements of a boomerang and of the fall and flight of the seeds of the sycamore.

The gyropter is made up of a long body, with a head and a tail, turning on an axis situated one-third of the distance from the head to the tail.

The seat for the aviator at this centre of rotation remains immovable in the middle of the great boomerang.

The thing is not unlike a great banjo, the neck of which is turned at a right angle [*sic*] and ends in a hole. It is built of wood, strengthened by interior braces, and covered inside and out with canvas.

It has neither front nor rear. It is a body turning upon itself, a propeller-blade thrown into the air and given equilibrium by part of another blade placed there to balance the weight of the motor. This works a turbine which sends a stream of air at tremendous speed into the interior of the apparatus, whence it issues from the curved end of the tail and by its pressure on the surrounding air sets up a rotatory motion in the whole machine.

The motor is in the head. It is a rotatory [*sic*] motor,

with nine cylinders, making 1,200 r.p.m. The air rushes through a wide tube surrounding the aviator's seat. The latter is in a circular box on ball bearings. The air penetrates a sort of antenna made of wood and revolving about its longitudinal axis at the will of the pilot. This ends in a curved pipe through which the air rushes with force enough to prevent the car from partaking in the whirling motion of the rest of the

machine. This antenna is the rudder of the apparatus.

Underneath is a lens-shaped float, which acts as a cushion in descending and as a hub on which the machine revolves when started on the ground.

The air rushes around the machine and is expelled from the end of the tail with a speed of 100 metres a second, about seven cubic inches [*sic – clearly incorrect; Ed.*] being discharged per second. The surface of the apparatus is 12 square metres, and it weighs, pilot included, 500 kilograms.

When the motor is tilted at an angle to the plane of revolution of the whole, gyroscopic action makes the gyropter rise. There are two opposite gyroscopic motions, one of the motor, the other of the whole machine, and these ensure stability under the guidance of the pilot who can, of course, change at will the angle their planes make to each other.



In terms of RAF adoption he credits (p62) Flight Lieutenant Robert "Bob" Stanford Tuck with being the first to try pairs when commanding No 92 Squadron at the time of Dunkirk and Squadron Leader Adolph "Sailor" Malan, commanding No 74 Squadron, as the first to form a viable squadron fighting formation based on pairs — although this comprised sections of four aircraft in line astern rather than finger four. By early 1941 (p75) Spick states that the finger four had been widely adopted by Fighter Command.

Whilst I appreciate this is not a definitive answer I hope it is of use — or at least interest.

**Orde Saunders** Falkirk, Scotland

P.S. As a boy I had the honour to meet Bob Stanford Tuck; unfortunately I was too young then to remember much about it now, but his name always jumps off the page when I read it.

### Looks like a UFO

**SIR** — Xavier Rouilly [grandson of Didier Rouilly — see *Messieurs Papin et Rouilly's Astonishing Whirling Leaf* in TAH27] forwarded

to me the accompanying photograph (see panel **ABOVE**) of a model of the Gyroptère exhibited at the *Musée du Château des ducs de Wurtemberg* at Montbéliard in eastern France. This exhibit, "Objets Volants Naturellement Inspirés" (Flying Objects Inspired by Nature — the French acronym "OVNI" = "UFO", although in this case it stands for *objet volant non identifié*), shows how nature inspired aeronautics. Xavier had supplied original blueprints to the museum's modellers.

**Jean-Christophe Carbonel** Montreuil, France

[Further information on the Gyroptère was provided by Australia-based TAH subscriber and Airminded.org airpower blogger Dr Brett Holman — a newspaper article entitled *Boomerang Aeroplane* which was published in the Friday, May 21, 1915, issue of *The Broadford Courier and Reedy Creek Times of Broadford, Victoria, Australia* (founded in 1893, the paper survived until 1916). Here is the internet link to it — <https://trove.nla.gov.au/newspaper/article/65416083?searchTerm=aviation> — but see the panel **ABOVE** for a lightly edited transcript — Ed.]



# "A melancholy story of delays, disappointments and retardations..."

## THE BRABAZON COMMITTEE — A POLITICAL HISTORY

Digging deep into the archives **PROFESSOR KEITH HAYWARD FRAeS** marks 75 years since the publication of the final report of the wartime Brabazon Committee — convened to analyse the potential post-war civil aircraft market — with an examination of its political objectives and the results of its conclusions in the immediate post-war period

**I**N DECEMBER 1945 Lord Brabazon of Tara, one of Britain's pioneering airmen, delivered his final report on a future programme for civil aircraft development in the UK.<sup>1</sup> His Committee's work had begun in December 1942 with a brief to plot a return to domestic civil aircraft development, which had been suspended upon the outbreak of war. Ultimately this would lead to a government-funded programme of prototype development and construction that would cost in today's money some £1.35bn, for a return of £282m, mostly from sales of the Vickers Viscount. The Committee and its final programme of development was an unprecedented intervention by the government to stimulate innovation in civil aerospace.<sup>2</sup>

With hindsight, the programme overall was conceptually flawed and only partly successful as a predictive and prescriptive policy. Of the seven "Brabazon Types" produced, only two (the Viscount and de Havilland's Dove) can be counted as successful projects; the de Havilland Comet was, of course, a tragic "near-miss". The Brabazon programme was abandoned as an approach to the sponsorship of civil aerospace even before a non-interventionary Conservative government arrived in 1951. However, it laid the foundations for Britain's return to the civil aircraft market and helped to keep alive an industry facing rapid post-war demobilisation.

On the outbreak of war in September 1939, UK domestic production of transport aircraft ceased

**BELOW** *Renowned British artist Terence Cuneo painted this magnificent portrait of the Bristol Brabazon taking off from Filton, for inclusion in the company's brochure for the behemothic airliner in January 1950. Don't bother to look for Cuneo's signature mouse — he did not start incorporating these into his paintings until a few years later!*

TAH ARCHIVE





in order to focus on combat types: "The work of aircraft designers must, at the present stage of the war, be devoted wholly to war requirements".<sup>3</sup> Admittedly, this was perhaps not much of a sacrifice given the low relative technical standing of pre-war British airliners, but it would imply an even steeper hill to climb technically at war's end if the UK was to compete in world markets.<sup>4</sup> For the duration of the war, the UK would rely largely on American transport aircraft and some British bomber conversions, such as the Avro York.

The decision to begin work on the post-war reconstruction of a civil aircraft capability is said to have stemmed from Winston Churchill's visit to Russia in 1942, when he had to travel in the freezing bomb bay of a Consolidated Liberator bomber, bringing home to him the absence of modern British airliners and the need for action with regard to future British transport aircraft.<sup>5</sup>

Perhaps more relevant was a number of wider industrial and economic factors, in particular the long-term survival of the aircraft industry. Thanks to the pre-war rearmament programme and the creation of "shadow factories" producing large numbers of fighters and bombers, the aircraft industry would mushroom from 24,000 employees in 1934 to 1.7 million in 1944. This was likely to prove unsustainable at the end of the war, but a reversion to the pre-war position was also regarded as untenable. The expectation was that the post-war industry would contract to around 180,000 — still substantially higher than pre-war levels.<sup>6</sup> There would be a military requirement for aircraft, but probably at a much-reduced level. Peacetime, however, should see the return and expansion of civil aviation, and a concurrent demand for domestic and valuable export sales of airliners.

It was evident that, with the development of a new generation of American transport aircraft, British companies would struggle to compete. Britain's clear lead in jet-engine technology held the prospect of some, albeit undefined, advantage, but without government intervention industrial survival seemed unlikely. As a result, Lord Brabazon was asked in late 1942 to form a committee to investigate the issue and make suitable recommendations. The committee was to report directly to the Minister for Aircraft Production, Sir Stafford Cripps, a Labour member of the War Cabinet.

### The First Committee

The seven-man committee comprised officials from the Ministry of Aircraft Production (MAP) and the Air Ministry (AM) and met only nine times before publication of its first interim report in February 1943. This was little more than a broad sketch of future needs, accompanied by a



**ABOVE** Lt-Col John Theodore Cuthbert Moore-Brabazon, 1st Baron Brabazon of Tara, GBE, MC, PC, HonFRPS, was born on February 8, 1884, and went on to become a British aviation pioneer and Conservative politician. He was the first Englishman to pilot a powered heavier-than-air machine in England, on the Isle of Sheppey in May 1909. He died on May 17, 1964.

very optimistic view of future markets, with no clear idea of who might be operating the aircraft.<sup>7</sup> It recommended the adaptation for civil use of four military types of aircraft ("interim types"), which were then in, or near, production, and the design of five new types specifically for civil use.<sup>8</sup> The latter were:

- a very large long-range landplane for the North Atlantic route;
- an economical replacement for the Douglas DC-3 for European services;
- a four-engined medium-range landplane for the Empire routes;
- the most advanced of them all, a jet-powered mailplane for the North Atlantic;
- a twin-engined 14-passenger feederliner, later divided into two sub-divisions.

These five (later seven) requirements would collectively evolve into the nine final "Brabazon Types", and the focus of the post-war Brabazon programme.<sup>9</sup> At a War Cabinet meeting on February 25, 1943, Cripps urged ministers to accept the Brabazon recommendations, as steps had to be taken immediately "if the production of civil aircraft from the end of the war onwards is to employ any appreciable number of men, and if we are to be in a position to make a worthy contribution to world air transport in the post-war era". Cripps was mindful of the impending



**ABOVE LEFT** Sir Stafford Cripps was a Labour politician who served as Ambassador to the Soviet Union during 1940–42 and Minister of Aircraft Production from November 1942 to May 1945. **ABOVE RIGHT** The first Minister of Aircraft Production, Lord Beaverbrook, was appointed Lord Privy Seal in September 1943, serving until war's end.

talks with the Dominions and the USA over post-war arrangements for air transport generally, and that the UK had every intention of playing a major role in the future of world civil aviation.<sup>10</sup>

There were two wider political and industrial implications; the War Cabinet noted that if the UK was to maintain a substantial aircraft industry after the war and to compete with the USA, the country would have to plan to build in much larger numbers than the minimum required to satisfy routes within the Empire. Making this clear to the Americans would also strengthen the government's hand in forthcoming air traffic negotiations.<sup>11</sup> Guarantees of prototype-funding would also be desirable if the government was to encourage firms to combine, in order to "see that our civil aviation was effectively organised on the basis of the types now proposed".<sup>12</sup>

The main obstacle was the need to release design staff from military projects, but the Cabinet agreed that measures would have to be taken to transfer the necessary skilled personnel. It confirmed that the UK had every intention to "play, and have the resources to play, a big part in post-war air transport". The commitment would be "on a scale and quality in keeping with our world position". The government undertook to accept the "financial responsibility for the initiation of a programme of civil aviation adequate to provide a minimum number of essential types of aircraft in the immediate post-war period".<sup>13</sup> The MAP would oversee the programme using the military form of procurement and contracting. Although UK and Dominion airlines would be the initial customers of the Brabazon and interim types, like the military, they would have only a general role in setting requirements. The manufacturers would also be required to incorporate equipment

provided by the MAP under the so-called "embodiment loan" system.<sup>14</sup>

In June 1943 Winston Churchill weighed in with a personal memorandum on the future of civil aviation. He recalled the highly subsidised environment of pre-war commercial operations and political constraints on flights. He noted that the USA had used the war to establish a presence on a number of new routes, and that its industry was "in a better place than ours to step into civil aviation the moment war ends". He cautioned against too-high expectations that the UK could match this effort, or that the post-war world would, in the short term, need the same level of capacity needed to fight a world war. This implied a relatively small number of aircraft to meet demand, and suggested the production in the UK of around 40 airliners a month, compared to the then-current output of 400 bombers.<sup>15</sup>

### **The American threat**

A trenchant note from Lord Beaverbrook, the first Minister for Aircraft Production when the ministry was established in 1940, but at the time Lord Privy Seal, painted a picture of a post-war world in which the Americans would use their technological superiority to dominate the market for air travel, underlining the importance of the Brabazon programme. Even if British and Dominion airlines were able to buy American equipment, these would be second-class aircraft. He concluded that "we cannot give a lead to the Dominions unless we are in a position to supply British [aircraft] with British engines. If we fail to provide [these] for the Dominions at the end of the war, then the leadership of air routes in the Empire will pass to the USA".<sup>16</sup>

But how much would this cost? As one official





**ABOVE** The D.H.95 Flamingo was de Havilland's first stressed-skin all-metal aircraft; it made its maiden flight on December 22, 1938. A typically elegant de Havilland design, the handsome high-wing twin-engined monoplane could carry up to 17 passengers and offered similar performance to that of the contemporary Lockheed 10 Electra.

noted, "estimating future costs can only be a shot in the dark". The best approach the MAP could come up with was to use the cost of developing the pre-war de Havilland Flamingo as a guide, and to add a contingency.<sup>17</sup> The Chancellor of the Exchequer, Sir Kingsley Wood, while agreeing with these proposals in February 1943, could not at this stage "accept in principle that the production of civil aircraft after the war will necessarily be financed from public funds". He also wanted to be informed of any proposed spending on civil prototypes of bomber conversions "not in support of the war effort".<sup>18</sup>

### The Second Committee

Lord Brabazon was asked to form a second committee with more comprehensive and detailed terms of reference. This convened in May 1943 and included industrial and airline representation, and was remitted to examine more detailed technical issues such as cabin pressurisation. This was a more detailed and technically qualified body, meeting frequently over the next two years. It generated more than 151 papers on technical and market issues and further refined the "interim types" and "Brabazon types".<sup>19</sup> It also worked closely with a second committee on air transport, chaired by Lord Beaverbrook, to consider future civil aviation policy. A conference in October 1943, which included representatives from the Dominions, led to an increased priority afforded to the Avro Tudor interim type and added several requirements to the original five Brabazon types.<sup>20</sup>

This committee's work was complicated by the fact that official attention was focused on the war effort, and specific knowledge of new American transport aircraft was sketchy. The best

### The Committee members

BOTH BRABAZON COMMITTEES were chaired by Lord Brabazon of Tara, and incorporated the following members:

#### First Committee

Sir Henry Self (Ministry of Aircraft Production — MAP); Sir Francis Sheldermine (Air Ministry — AM); William P. Hildred (AM); J.H. Riddoch (AM); N.E. Rowe (MAP); K.T. Spencer (MAP)

#### Second Committee

Alan C. Campbell-Orde; Capt Geoffrey de Havilland; William P. Hildred; Gp Capt William Helmore; Maj J. Ronald McCrindle; Maj Ronald H. Thornton; Air Cdre Alfred R. Wardle; J.H. Riddoch

information had been gleaned following a mission to the USA led by engineer Sir Roy Fedden, which reported in March 1943. His report underlined the vast difference in the scale and scope of American companies, including privately owned research facilities and a much higher standard of production efficiency. This contrasted with an MAP report that found many UK aircraft companies to be poorly managed. Even the large shadow factories, often run by car companies with greater experience of mass production, were still small compared to American facilities. Industrial capacity and competence would clearly have an impact on delivering a major civil effort from scratch after the war.<sup>21</sup>

The Committee was especially limited in the degree to which it was able to commission detailed market or technical studies; inevitably perhaps, many of its assumptions and evidence were derived from pre-war notions about air travel. However, the Brabazon Committee



**ABOVE** Construction of the Brabazon Committee's eponymous Type I transatlantic airliner began at Bristol's Filton factory in October 1945. The prototype, G-AGPW, did not make its maiden flight until September 4, 1949, when the company's chief test pilot, A.J. "Bill" Pegg, took the eight-engined giant on its first 25min flight.



**ABOVE** In 1950 the rear section of G-AGPW's cabin was furnished with 30 BOAC reclining seats. The Brabazon was conceived as a luxurious transatlantic airliner — but, as test pilot Wally Gibb opined, "that wasn't what the airlines wanted; they wanted to ram as many passengers as possible into the tube and give 'em lunch on their laps".

## The interim and Brabazon Types, 1944–45

### The Second Brabazon Committee Interim Types — January 1944

- (i) Pressurised transport based on Avro Lincoln for non-stop North Atlantic service (**Avro Tudor I**)
- (ii) **Avro York** (already in production)
- (iii) Civil version of Handley Page Halifax III (**Handley Page Hermes**)
- (iv) Civil version of Short Sunderland (**Short Sandringham**)

### The Second Brabazon Committee's recommendations — March 1944

- (i) Large transatlantic airliner
- (ii) North Atlantic 100,000lb airliner, refuelling at Gander, Newfoundland
- (iii) Four-engined airliner, medium-range, for trunk routes
- (iv) Twin-engined airliner, medium-range, for European routes
- (v) High-speed airliner with jet propulsion
- (vi) 14-seat feederliner, for domestic UK services
- (vii) Eight-seat twin-engined airliner for feeder routes and air taxi services

### The Brabazon Types, Second Committee, fifth (final) report — November 1945

**Type I** Transatlantic non-stop airliner. Became **Bristol Brabazon I**; Air Ministry (AM) Specification 2/44

**Type IA** Transatlantic non-stop airliner, **Bristol Brabazon II**; AM Specification 2/46

**Type IIA** European transport. **Airspeed Ambassador**; AM Specification 25/43

**Type IIB (i)** European transport. **Vickers Viceroy** (to become Viscount); AM Specification 8/46

**Type IIB (ii)** European transport. **Armstrong Whitworth Apollo**; AM Specification 16/46

**Type III** Long-range Empire airliner. **Avro 693 "XXI"**; AM Specification 6/45

**Type IV** High-speed jet-powered mailplane. **de Havilland Comet**; AM Specification 22/46

**Type VA** Medium-range feederliner. **Miles Marathon**; AM Specification 18/44

**Type VB** Small feederliner. **de Havilland Dove**; AM Specification 26/43

was sufficiently prescient to specify jet or turboprop propulsion for half of the final outline specifications.<sup>22</sup> After a review of their military commitments, several firms were asked to submit designs for four of the five new types.

Choosing the firms to compete for contracts had a degree of "hit-and-miss" about it. Bristol seemed an obvious choice for the Type I; it had spare capacity and the government intended that it be positioned to develop a future capability to produce very large bombers. Airspeed had begun to achieve a promising civil competence in the late 1930s; it too had spare capacity and the MAP wanted it to switch to metal construction for strategic reasons. Vickers-Armstrongs was a well-supported firm and would be an obvious contender in the post-war environment. Geoffrey de Havilland's company had a pre-war record of producing small civil aircraft, and he was also thinking about more radical design concepts to exploit the then-secret turbine engine technology. In this respect he was helped by MAP ignorance about the latter, which allowed de Havilland a degree of freedom to produce what rapidly evolved into a genuine airliner.

In retrospect, however, there was little critical review of the industrial base needed to support such an ambitious programme, or to ensure that failing projects were cancelled sufficiently early as more accurate market data became available, or when technical problems threatened commercial failure. The MAP was also unable — or unwilling — to force firms to co-operate, or to use its power over contracting to force a degree

of rationalisation that was seen as desirable in the post-war world. In the event, maintaining design diversity — a policy that would also affect military planning after 1945 — had priority.<sup>23</sup>

### Brabazon's Brabazon

The first company to be selected was Bristol, to deliver the long-range Type I requirement. This was a challenging specification, with the cost of two prototypes and 35 production aircraft put at £2.4m. But, given the fact that it would incorporate innovations essential for both future civil and military aviation, "industry had to get to grips without delay". This would become the eponymous Brabazon airliner.<sup>24</sup> But all seven of the Brabazon types were expected to have started flying trials by January 1948. This assumed that the programme would be assigned "top priority", which would entail diverting draughtsmen and design staff to civil work in unprecedented numbers. But as there was still a critical need to maintain progress in the military sector, the challenge was increasingly to find qualified people, who "cannot be conjured out of nothing".

In May 1944 Cripps noted that these problems were likely to persist post-war, as the armed forces would still need cutting-edge aircraft. A solution proposed by the MAP was to assign comparable priority to Types I, II and VB (a sub-division of Type V for an eight-seat de Havilland Dragon Rapide replacement) as well as the interim types, all of which also had potential military value. Cripps's request for shifting resources to the civil programme was endorsed by Beaverbrook.<sup>25</sup>



**By some margin the most successful of the designs that could trace their heritage back to the Brabazon Committee, the Vickers Viscount turboprop was the result of a mating of state-of-the-art aircraft design and cutting-edge powerplant technology for the Committee's Type IIB (i) category. The prototype, G-AHRF, made its first flight on July 16, 1948.**



The shortage of skilled personnel was hard to finesse by simply changing the status of the civil programme, and would require action to bring in people from outside the aircraft industry. There was also a qualitative problem in so far as the industry had done little new work during the war, and, without an intensive design programme, the UK would be “seriously and irrecoverably behind other powers in aircraft design”. Underlying these concerns were the emerging programmes for post-war civil and military aircraft, the latter including a second generation of jet fighters, a range of jet bombers and other requirements, incorporating a total of some 70 aircraft projects. This would be a major stimulus for the industry and enable the UK to sustain a strong position in the world, but implied a major challenge to find the necessary industrial and technical resources.<sup>26</sup>

This ambitious view of the post-war aircraft industry coincided with an important “mid-term” review of the programme compared to American transport aircraft development, completed in November 1944. This was in part based on views and information provided by BOAC

[whose relationship with the Brabazon Committee's findings and subsequent hardware development — or lack thereof — will be covered by Ralph Pegram in a forthcoming issue — Ed.] and by the earlier Fedden report. Given that there was still no formal exchange of information with the USA, hard data was “difficult to come by and must be treated with reserve”. More importantly, as none of the Brabazon types actually existed, performance comparisons were naturally highly speculative. On the basis of this set of “known unknowns”, the report's overall assessment was optimistic, in the sense that the outline requirements were on the mark, and that key technological objectives were well defined. These included cabin pressurisation, tricycle undercarriages, laminar-flow wings and automatic controls. The report felt that in the case of engines, the UK was better placed, with the Rolls-Royce Merlin seen as a major asset. However, the Americans excelled in weight control, and analytic staff had considerable authority in the development process; the report noted that there was “considerable room for improvement in weight-control in British firms”.<sup>27</sup>

**BELOW Initially designed to the Committee's Type IV specification for a high-speed jet-powered mailplane, de Havilland's D.H.106 was the most ambitious of Britain's commercial aircraft ventures in the immediate post-war period. Named Comet in December 1947, the prototype, G-5-1 (later G-ALVG), made its first flight on July 27, 1949.**

BAE SYSTEMS





A review of the individual Brabazon types revealed a mixed position. Adjustments were needed to nearly all of the specifications and several would be in service later than planned, which would undermine their competitiveness. Significantly, the Type IV was to have a much higher priority. Although still conceived as a fast transatlantic jet-powered “mail carrier”, BOAC viewed it as a key development. As it embodied “the very latest knowledge”, the November 1944 report stated, it should be produced “at the earliest possible moment as a matter of prestige, and to establish a lead in this development. *Its commercial efficiency and operational range are of secondary importance* [author’s italics]”.

The report continued in a vein that would come to underpin the Comet’s wider significance:

“In the interests of all British airline operators and of the British aircraft industry, [BOAC] attaches the highest importance and urgency to the production of such an aircraft upon which its own success may well depend in the immediate post-war years; it is therefore prepared to back this development to the utmost.”

The November 1944 review was largely happy with the general direction of travel of the Brabazon types and needed “no revision”, but “it must not be forgotten that the American types are considerably more advanced *in time* [emphasis in original] than ours. It is accordingly essential that work on the Brabazon types should proceed as rapidly as possible”.<sup>28</sup>

### A disappointing legacy?

By the time the Brabazon Committee finished its work in late 1945, several of the sponsored projects were under development, including the Type I Brabazon prototype and, significantly, Vickers had pressed the case for a turboprop answer to the Type II specification. While there had been some progress in creating the basis for Britain’s re-entry into the civil aircraft market, delivering

**ABOVE LEFT** Labour politician Harry Nathan was appointed Minister of Civil Aviation on October 4, 1946, serving in the role until May 31, 1948. **ABOVE RIGHT** John Coldbrook Hanbury-Williams (Sir John from 1950) was the director of British textile company Courtaulds during 1946–62, and appointed chairman of the committee on civil aircraft procurement in 1948.

aircraft in quantity and managing the industrial reconversion to handle full-scale development of the Brabazon types was proving difficult.

In October 1945, with the Second World War over for more than two months, there was something of a crisis affecting UK civil aviation caused by the “lack of aircraft”. In the view of the Minister for Civil Aviation (established in 1944), Lord Nathan, this would not be resolved until the production of civil aircraft was decided “at high level” to give the sector “its appropriate peacetime priorities”. The end of the war had made no difference to the allocation of skilled labour and raw materials. At a time “when the USA is starting operations all over the world, our own reports on civil aircraft production [present] a melancholy story of delays, disappointments and retardations”. Nathan concluded: “civil programmes should be given a priority similar to that which combat machines received during the war.”<sup>29</sup> Delays in the programme had to be met by dollar purchases of American aircraft for BOAC, and the new short- to medium-haul national airline, British European Airlines, had to accept uncompetitive aircraft until the Viscount arrived.

The system of initiating designs “in-house” by the Ministry of Supply (MoS) did not last long in the post-1945 environment. In 1948, following a series of crashes of the Avro Tudor — a four-engined development of the Lincoln bomber broadly designed to the Brabazon Type III designation — the government asked John Hanbury-Williams, chairman of textile company Courtaulds, to review the process for developing and ordering civil aircraft. This produced two

1 Lord Brabazon held Royal Aero Club Aviator's Certificate No 1 and was Minister for Transport during 1940–41 and Minister of Aircraft Production during 1941–42  
 2 France would adopt and persevere with strategic planning in rebuilding its entire aerospace industry in the 1950s  
 3 House of Commons, December 1942  
 4 The UK also gave up work on rotorcraft, an area in which it held a strong world position  
 5 Work on the Avro York, a transport derivative of the Lancaster, began in February 1942  
 6 Hayward, K., *The British Aircraft Industry*, Manchester University Press, 1989, Chapter 1  
 7 Phipp, M., *The Brabazon Committee and British Airliners 1945–1960*, Tempus Publishing, 2007, pp15–17  
 8 For more on the relationship between BOAC and the Brabazon Committee and the unbuilt Brabazon designs, see the forthcoming article by Ralph Pegram in *The Aviation Historian*  
 9 Memorandum from Minister of Aircraft Production, February 24, 1943, The National Archives (TNA) ref CAB 66/34/33  
 10 *ibid*  
 11 These would culminate in the agreements made at the Convention on International Air Travel in Chicago in 1944  
 12 Meeting of the War Cabinet, February 25, 1943, TNA CAB 65/33/35  
 13 *ibid*  
 14 Hayward, K., *op cit*, pp39–41  
 15 *Post-War Civil Aviation*, a Memorandum from the Prime Minister, June 22, 1943, TNA CAB 66/38/7. The main thrust of the document is a discussion of issues affecting the future regulation of air services that would be discussed the following year in Chicago (see 11)  
 16 Memorandum by the Lord Privy Seal, December 3, 1943, TNA CAB 66/43/37  
 17 Initial MAP deliberations on the civil aircraft programme may be found in TNA file AVIA 15/95, September 1943–March 1944  
 18 Meeting of the War Cabinet, February 25, 1943, TNA

CAB 65/33/35

19 One of these included an unsolicited proposal for a new airport for London located on the Thames Estuary, connected by express rail to central London, with an airfield for regional traffic and a lagoon for long-range flying-boat services. The Brabazon papers are lodged at Royal Air Force Museum Hendon  
 20 Phipp, M., *op cit*, pp17–18  
 21 Postan, M.M., Hay, D., Scott, J.D., *Design and Development of Weapons*, HMSO, 1964, p154. The Fedden Mission report is available online. The Americans could only wonder at the poor facilities available in the UK, even at de Havilland's Comet production line, "like a small town auto-repair shop", Phipp, *op cit*, p93. Conversely, Avro's organisation and delivery of the Lancaster was superb, and even impressed American observers. See McKinstry, L., *Lancaster: The Second World War's Greatest Bomber*, John Murray, 2010, Chapter 12  
 22 Hayward, K., *Government and British Civil Aircraft*, Manchester University Press, 1983, pp12–13  
 23 Hayward, K., *op cit*, p42  
 24 Memorandum from Minister of Aircraft Production, November 22, 1943, TNA CAB 66/43/32  
 25 TNA CAB 66/50/22, May 25, 1944. The two types excluded from the list of high-priority Brabazon Types were the baseline requirements for what became the Comet and Viscount  
 26 Joint Report to the War Cabinet from the Ministers of Labour, Aircraft Production & Air, November 16, 1944, TNA CAB 66/57/49.  
 27 *Comparative Performances of British & American Transport Aircraft*, joint note by the Secretary of State for Air and the Minister of Aircraft Production, November 1, 1944, TNA CAB 65/57/11  
 28 *ibid*  
 29 *Civil Aviation Policy*, Memorandum by the Minister of Civil Aviation, October 12, 1945, TNA CAB 129/3/22. The Ministry of Civil Aviation was created in 1944 to oversee the development of UK airline policy; it also had some responsibility for post-war civil aircraft production

Civil Aviation Acts, which, while authorising government support for future civil development, placed the onus for launching projects on industry, backed by orders from the nationalised airlines. From the early 1950s, the Conservative government would insist on companies funding development as "private ventures", and direct public investment in civil aerospace projects would not return until the introduction of "launch aid" — government subsidisation in return for a share of future profits — in 1960.

In general, the results of the Brabazon programme were disappointing. The eponymous airliner was obsolete on arrival, and the Tudor was both a technical and commercial failure. The

Dove and Viscount were the only unequivocal successes. The Comet's tragic history represents the great "what-might-have-been" story of British aviation. It is perhaps unfair to judge the Brabazon programme from the perspective of hindsight. The relationship between British governments and the civil aircraft industry from 1945 was rarely easy, with mistakes and failures on both sides. The Brabazon Committee's most important outcome was that the UK did recreate a capacity to design and build civil aircraft. It may have been a long and twisting path, but there is a direct legacy linking Brabazon with Airbus wings and Rolls-Royce's "big fan" engines, both still plying their trade in today's skies.

***Designed to the Committee's Type VB specification for a Dragon Rapide replacement, the same company's D.H.104 Dove prototype, G-AGPJ — seen here with original fin — made its first flight at Hatfield on September 25, 1945, just six weeks after the defeat of Japan. Like the Viscount, it was a success, with nearly 550 built.***

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19 de Havilland Hornet and Sea Hornet	£11.50	53 Avro Anson	£13.50	87 Grumman Avenger	£16.00	121 Douglas A-4 Skyhawk	£25.00
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## THE ELECTRONIC COUNTERMEASURES MOSQUITOES OF THE USAAF'S 25TH BG

By late 1944 the USAAF's UK-based Eighth Air Force — tasked with taking the Allied bombing campaign to the enemy by day — was embroiled in a rapidly evolving electronic arms race, from which arose the need for a fast, agile aircraft capable of creating a screen of radar-confusing “chaff”. Enter the 25th Bomb Group's Mosquitoes, relates [BILL CAHILL](#)





**MAIN PICTURE** Hatfield-built de Havilland Mosquito PR.XVI NS748 of the USAAF's 25th Bomb Group (BG) has its starboard Merlin engine run up at RAF Kimbolton in Cambridgeshire, as part of a check flight from its base at RAF Watton in Norfolk.

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**TOP** Lt Warren Borges flew weather reconnaissance missions with the 25th BG's 653rd BS and two "Graypea" missions with the 654th BS in late March 1945.

EIGHTH AIR FORCE ARCHIVE, PENN STATE UNIVERSITY

**T**HE HARDEST PART of the mission was over. A rendezvous with trigger-happy bombers had engendered no friendly fire and the chaff dispersal had started on time and on target. But, just as the mission seemed to be wrapping up, the radio crackled and Lt Roger Gilbert received warning of Luftwaffe jets in the area. His navigator, Lt Raymond Spoerl, immediately unbuckled his lap-belt to turn around and poked his head into the observation bubble in the canopy to scan for the new threat. Almost immediately, Spoerl shouted into the intercom that a Messerschmitt Me 262 was converging on them from six o'clock high. Seconds later he warned Gilbert that the jet was firing and directed him to break left. Gilbert racked Mosquito PR.XVI RF992 into a hard bank; midway through the turn 30mm shells shattered the Perspex canopy and thudded into the instrument panel and radio. Another burst from the enemy jet tore off 3ft (1m) of the Mosquito's port outer wing. Perversely, the damaged wing enabled Gilbert to turn even more tightly and the German jet flashed by to starboard. After a drop of 6,000ft (2,000m), Gilbert recovered and limped back to his home base at RAF Watton in Norfolk. During the return, he began to wish his job was anything other than piloting an unarmed fighter ten miles out in front of a stream of USAAF bombers.

## THE THREAT

The US Eighth Air Force confronted an inherently different German integrated air-defence system from that faced by the RAF's Bomber Command. The daytime operating environment of the Eighth's bombers of VIII Bomber Command allowed their adversaries — either fighters or anti-aircraft (AA) artillery — to acquire their targets visually when weather was good. By the middle of the war, the Luftwaffe had a centralised control system in place for its day fighter aircraft. A national-level air picture was built based on a myriad of inputs, ranging from passive detection systems that tracked USAAF radio traffic to a large assortment of radars. Luftwaffe day fighters were scrambled by their Fighter Division *Zentral Gefechtsstände* (Central Command Post) and given directions to the incoming mass of USAAF bombers. Once in the vicinity of the latter, it was relatively easy for the fighters to acquire the bomber formations visually and start their attacks.

By 1944 Luftwaffe AA batteries were organised into *Gross-Batterie* of up to three Flak batteries of four guns all firing on one designated target. *Kommandogeräte* optical trackers enabled the gun batteries to track and engage high-flying bombers on clear days — but clear days were a rarity over central Europe for many months of the year. For less-than-clear weather conditions *Würzburg* AA fire-control radars provided altitude and pointing data to the guns, allowing accurate engagement through clouds.





**LEFT** A Würzburg-Riese ground-controlled intercept radar installation for directing nightfighters, near Skorpung, Denmark, at the end of the war. Earlier, smaller versions of the Würzburg were introduced into service in 1940, and a railway carriage-mounted version of the Riese was also developed as the Würzburg-Riese-E.

**BELOW** Mosquito PR.XVI NS708/"M" of the 25th BG's 653rd BS at RAF Bungay in Suffolk. The Eighth AF's Mosquitoes retained their RAF serials and in August 1944 were given distinctive red empennages as a visual recognition aid. The rest of the airframe was finished in PRU Blue with standard USAAF insignia.

Operation Gomorrah, the Allied strategic bombing attack on Hamburg in July 1943, saw the introduction of *Window* into the electronic fight on a massive scale. Paper-backed aluminium foil cut to half of the target-radar's wavelength, *Window* was originally optimised for use against Würzburg-Riese ground-controlled intercept radars and Würzburg fire-control radars. This had minimal impact on the German day fighter force, as the consolidated air picture used by the Zentral Gefechtsstände used radars that were not affected by *Window*. Anti-aircraft artillery was another story, however.

Once the use of the American AN/APS-15 H2X radar (a development of the British H2S system) had started to proliferate within the Eighth AF by mid-1944, the USAAF was more comfortable bombing through the overcast, making the Würzburg radar the critical link for the Germans to engage the American bombers. In October 1944, 80 per cent of all American bombing was conducted by radar. If denied their own radar data, German guns were forced into inefficient barrage-firing that vastly increased expenditure of ammunition for limited results. As the day-bombing offensive intensified in 1944, jamming the Würzburg radar to deny the

AA artillery accurate firing solutions became a priority for USAAF planners.

December 20, 1943, saw the first operational use of chaff, the USAAF term for *Window*, by VIII Bomber Command, during an attack on Bremen. Although it was initially released by hand from a bomber's open waist-gunner positions, a more efficient method was soon in place that had the radio operator dispensing chaff packets at a set rate via a purpose-built chute. By January 1944 every aircraft in the Command's Lead Combat Wings was fitted to dispense chaff.

## THE ELECTRONIC ARMS RACE

For their part, the Germans had been working since *Gomorrah* to counter the effect of chaff on the Würzburg radar. First, the Würzlaus coherent-pulse Doppler system was introduced, which distinguished between moving bombers and stationary chaff; secondly, Nürnberg audio headphones enabled operators to listen to radar-echo modulation. These were in widespread use by November 1943 but only worked against small amounts of chaff and could be overwhelmed.

The USAAF also started to introduce active radar jammers into the mix. After an experimental period with the 3rd Bomb Division (BD) in the

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**Members of 25th BG(R) air- and groundcrew pose in front of one of the Group's Mosquito PR.XVIs at RAF Watton. The 25th BG(R) comprised three Bomb Squadrons — the 652nd BS, 653rd BS and 654th BS — which were collectively referred to as the "Eyes of the Eighth". BELOW The badge of the 653rd BS incorporated a mosquito with a telescope.**



autumn of 1943 showed the utility of the APT-2 *Carpet* airborne jammer, VIII Bomber Command HQ issued requirements for jammers to be fitted to all bombers. Jammers were set within a Bomb Group (BG) to cover the broad frequency range of the *Würzburg* radar, as each jammer could only cover a few megahertz (MHz) of bandwidth. Nevertheless, less than ten per cent of the bomber fleet had jammers by May 1944.

The Germans countered with the *Wismar* modification in March 1944, which provided for a change of frequency of up to 100MHz, and which further complicated the employment of jamming and chaff. It would take many months to produce enough *Carpet* jammers to outfit an entire BD, and strong evidence existed that the Flak arm had countered the worst effects of Allied countermeasures by mid-1944. Even when fitted with *Carpet* jammers, large bomber formations still needed the additional coverage provided by chaff. Once dispensed from an aircraft, chaff rapidly slowed down and was only able to screen trailing aircraft effectively. This meant the lead bomber formation had no protection and was more vulnerable; and, more importantly, these same aircraft contained the lead bombardiers and navigators responsible for getting an entire BD's bombs on target. What was needed was a screening force for lead units of the bomber formation on heavily Flak-defended targets when target cloud cover was forecast as being 4/10ths or greater.

At a conference on chaff held in June 1944, Eighth AF planners noted that the Ninth AF was protecting the lead combat box of its medium-

bomber formations by flying three aircraft out ahead to drop chaff. Keen to try out the concept, Eighth AF commanders decided to experiment with different screening-force concepts. Trials started in October 1944 with seven different formations, five of which used between four and 16 fighters of the 1st Scouting Force (Provisional) to release chaff "bombs" of droptanks full of chaff ahead of the bomber force. Two missions used bombers as the screening force, one of these using two Boeing B-17s sent ahead of the main force to screen the leading formations, while the other tried 36 bombers circling the target area dispensing chaff.



The Operational Analysis Section at Eighth AF HQ rigorously studied loss rates and the impact of chaff protection for the leading units. In November 1944 each of the Eighth AF's BDs undertook further experiments using bomber-screening forces. The 1st BD employed 12 B-17s as a screening force, equipped with jammers and chaff dispensers, while the 2nd and 3rd BDs used smaller formations for their screening forces. All divisions agreed that 12 bombers were required to produce a chaff cloud of adequate size to cover an attack on heavily defended targets. The use of B-17s for the screening force — a squadron's worth — was far from optimum as it pulled aircraft away from the main bombing effort. The heavy bombers also lacked the manoeuvrability to climb and rapidly "S-turn" to lay a good chaff trail, and were just as vulnerable as the force they were trying to protect. A better solution was required, and for this the Eighth AF turned to one of its catch-all units — the 25th Bomb Group (BG).

The 25th Bomb Group (Reconnaissance) was



**LEFT** Two groundcrew members work on the Rolls-Royce Merlin engine of a 25th BG(R) Mosquito. Maintenance standards within the 25th were extremely high, the Group's Mosquitoes having no armament and only pure speed and agility to get out of trouble. The 654th BS reported 90 per cent of its assigned 36 aircraft available for operations in March 1945.

**BELOW** A 653rd BS group photograph at RAF Watton. The pilots and navigators of the 653rd and 654th BSs were unique in that most had already completed a tour of 35 combat missions with other BGs and had volunteered to fly Mosquitoes with the 25th rather than take leave and return to the USA.

by taking H2X screen shots and flew high-altitude daytime reconnaissance missions with Mosquito PR.XVIs, and night reconnaissance missions with photo flashbombs using Martin B-26s.

### ENTER THE WOODEN WONDER

There was initial hesitation in using Mosquitoes for the chaff screening mission. Staff officers in the three BDs thought that screening aircraft should also be fitted with *Carpet* jammers to protect themselves from Flak as well as H2X radar for navigation, and the Mosquito was not large enough to carry all this equipment. The 2nd BD decided to continue to use bombers in the screening role and by the end of the year was flying six bombers with chaff dispensers as a screening force against heavily defended targets. Misgivings aside, in mid-November 1944 the 1st BD proceeded with a test involving Mosquitoes.

Colonel Budd J. Peaslee, commander of the 1st BD's 1st Scouting Force, was selected to supervise tests with 25th BG aircraft, the 653rd BS being selected to provide aircraft and crews for the demonstrations. The Mosquitoes were modified at the 2nd Strategic Depot at Abbots Ripton in

activated under the command of Lt-Col Joseph A. Stenglein on August 9, 1944, at USAAF Station 376, RAF Watton, Norfolk, UK, with the re-designation of the 802nd Reconnaissance Group (Special, Provisional). Subordinate squadrons were activated on the same day and included the 652nd Bomb Squadron (Weather Reconnaissance, Heavy), 653rd BS (Weather Reconnaissance, Light) and 654th BS (Reconnaissance Special, Heavy). The 652nd BS flew B-17s and Consolidated B-24s over the eastern Atlantic to gather meteorological data to be used in forecasting weather to aid planning for Eighth AF operations. The 653rd performed weather scouting and reconnaissance missions over the Continent using Mosquito PR.XVIs, while the 654th assisted blind-bombing

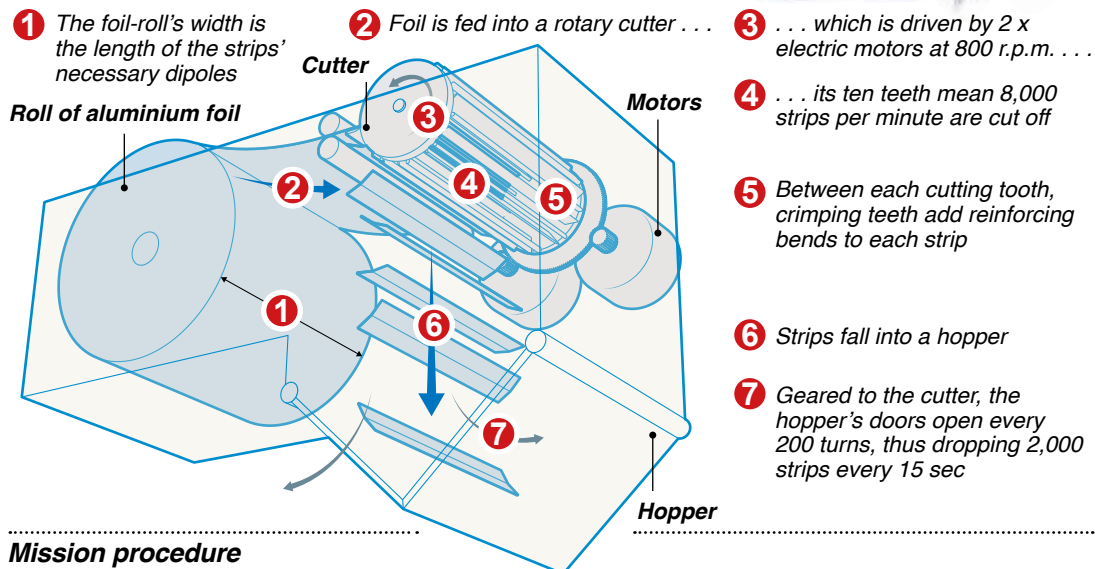




## "GRAYPEA" MISSIONS, 1944-45

**What is Window (chaff)?** Paper-backed aluminium foil cut to half a target radar's wavelength acts as a simple dipole, reflecting the radar strongly. Dropping in bulk could screen bombers from radar

### The chaff dispenser

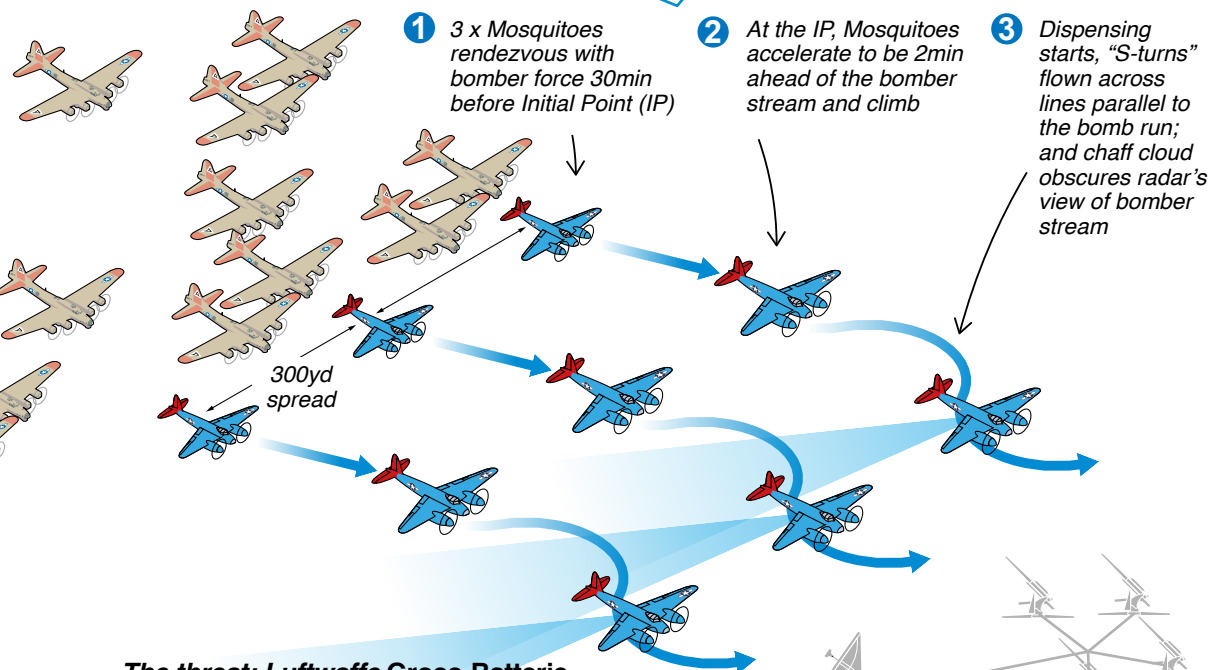


### Delivery aircraft: Mosquito PR.XVI

2 x A-1 dispensers with 1,800 chaff units



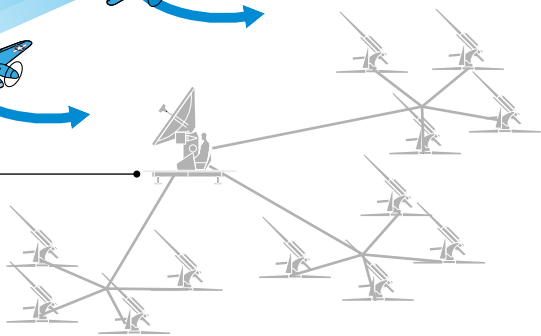
### Mission procedure



### The threat: Luftwaffe Gross-Batterie

1 x Würzburg-fire-control radar: range up to 40km (25 miles)

Up to 3 x Flak batteries of four guns each firing on one designated target



Graphic: Ian Bott [www.ianbottillustration.co.uk](http://www.ianbottillustration.co.uk)



**LEFT Colonel Leon Gray (left), Commanding Officer of the 25th BG(R) from September 1944, discusses tactics with Elliott Roosevelt, CO of the 325th Photographic Wing, of which the 25th BG was a part. Gray was highly decorated for his work with the 25th, earning a Distinguished Flying Cross with one oak leaf cluster and the Air Medal with 14 oak leaf clusters plus a Silver Star for "gallantry in action over Germany".**

Cambridgeshire by installing a plywood box in the front of the bomb bay which contained two automatic Type A-1 Chaff Dispensers. These cut chaff at the required length off a spool, with each Mosquito carrying approximately 1,800 units of chaff (see illustration on page 25). Initial plans called for the modification of 21 aircraft, with the assignment of seven to each of the 1st, 2nd and 3rd BDs. When difficulties were encountered in getting the equipment to operate properly, the number was reduced to four, pending completion of operational tests. After a series of flight tests over the UK, Peaslee flew the first operational test on November 29, 1944, during a 1st BD mission to Misberg, near Hanover. The test was successful and demonstrated that the speed and agility of the Mosquito made it suitable for this line of work. The 25th BG had a new mission.

On December 4, 1944, Mosquito PR.XVI NS512, with 25th BG CO Col Leon Gray at the controls and Lt Richard Davies as navigator, took off on the unit's first fully operational chaff mission. Alongside was Mosquito NS519 flown by Peaslee. The pair rendezvoused with the 1st BD over the Continent, and on reaching the Initial Point (IP —

starting point for the bomb run to the target), the Mosquitoes flew out ahead, leading the bombers on their raid against the railway marshalling yard at Kassel, Germany. The 1st BD bombers following behind received only inaccurate light to moderate Flak. The 25th BG dubbed subsequent chaff missions "Graypea" missions based on the combined names of the pilots of the first mission.

One last test was flown on December 5, this time against a captured Würzburg radar. Three Mosquitoes were involved, attempting to screen a bomber force from the radar using chaff. Based on information garnered from this test and the December 4 mission, the 25th BG refined its tactics for the next operation: a mission on December 9 to Stuttgart, accompanied by three Mosquitoes.

### A TYPICAL GRAYPEA MISSION

Graypea missions eventually developed into a routine that started with an alert from the Air Division (AD, as the Bomb Divisions were redesignated in early December 1944) to Group Operations that dictated the target, rendezvous point, screening manoeuvre, points to start and stop dropping chaff and chaff-dispense rate. As the aircraft were loaded and prepared, the navigation section of the squadron worked out the flight plan. On the day of the mission, the aircraft took off from Watton and completed a rendezvous with the bombers *en route* at a pre-arranged location, usually 30min before the IP, normally making contact with the Lead Bomber via VHF radio. Any changes from the target plan such as switching to the secondary target were also communicated at this time.

The Mosquitoes would then fly alongside the Lead Bomber to the IP, at which point the chaff-droppers would pull ahead by about 2min to the point of starting to dispense chaff,

**Hatfield-built Mosquito PR.XVI NS594 served with the 653rd BS. It is seen here before the Eighth AF's Mosquitoes acquired their red tails, painted overall PRU Blue with D-Day stripes and white fin letter with a white circle outline, denoting a weather squadron machine. This Mosquito groundlooped at Watton while serving with the 653rd BS on January 28, 1945. USAF**



*Displaying the distinctive red tail of the Mighty Eighth's Mosquitoes, Hatfield-built PR.XVI MM345/"Z" also bears reduced D-Day stripes and Roundel Blue propeller spinners. This aircraft was damaged in a landing accident at Watton on September 8, 1944, but was repaired, ultimately being struck off charge in July 1946.*

USAF



"S-turning" across a line parallel to the bomb run. A slow climb was usually started at the IP in order to help reduce airspeed and maintain interval. On occasion, 653rd BS crews provided weather updates to the bombers. Once the chaff dispensing was complete, usually taking around 5min, the Mosquitoes would return to base. Although many aircraft were fitted with LORAN (Long Range Navigation) equipment at this point of the war, most navigation was done using the Gee navigation aid.

The second Graypea mission had used three Mosquitoes, and extra missions flown in December showed this to be the optimal number of aircraft to provide adequate masking of the bombers from the Würzburg radars. Initial difficulties with the chaff-roll breaking off and jamming the chaff dispenser were resolved with an improved chaff-roll. The 653rd BS would receive tasking from higher HQ and assign two to four Mosquitoes to support each mission. In December 1944 the 25th BG flew a total of 13 Graypea missions comprising 35 individual Mosquito sorties, supporting 1st AD missions throughout central Germany. Mosquito NS519 was lost on take-off for the mission on December 27, reducing the number of chaff-capable aircraft to three until mid-January. In addition to the 13 Graypea sorties, the 653rd BS also flew 91 "Bluestocking" weather-recce sorties and six "Redtail" visual bomb-assessment sorties in the same month.

In January 1945 the 653rd BS again flew 13 Graypea missions totalling 31 Mosquito sorties with five additional sorties aborted owing to aircraft maintenance problems, including three incidents of undercarriage not retracting. These missions supported 1st AD sorties throughout central Germany. The 653rd BS also flew 114 Bluestockings and two Redtails that month.

Despite three additional Mosquitoes being modified with chaff-delivery systems and put into service in January, squadron strength remained low, as newly modified Mosquito NS594 crashed on landing after its sixth operational sortie and two chaff-modified aircraft were removed from operations. By February 1, 1945, the 25th BG had only three operational chaff-capable Mosquitoes.

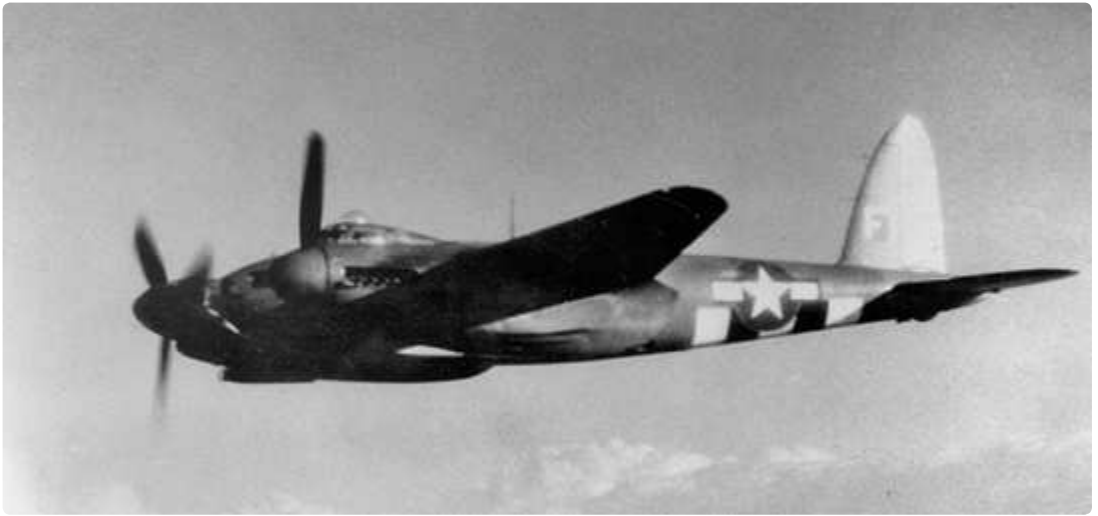
## EXPANDING THE MISSION

In February 1945 it was decided to transfer the Graypea mission from the 653rd BS to the 654th BS. This enabled the expansion of chaff-screening coverage to all three ADs, as the 654th BS had excess sortie capacity owing to the cessation of its "Mickey" H2X radar-mapping missions. The latter were never a good fit for the Mosquitoes as the type's electrical system was unsuitable for operating the H2X, and a lack of space hampered the navigator. The 653rd BS still flew the majority of the Graypea missions for February, flying 31 sorties to cover ten missions with only one abort, while the 654th BS started chaff-screening on February 24, 1945, and flew 16 sorties for five missions with no aborts. All missions were in support of 1st AD missions over Germany, including two to Berlin.

Three Graypea missions were flown with four instead of three aircraft, the fourth sometimes being briefed as a spare to cover maintenance aborts, and other times flying the mission. More Mosquitoes were modified to carry chaff in preparation for the expansion of the programme to cover all three ADs, with the 25th BG ending February with five operational chaff-carriers.

Although the 654th BS had taken over the Graypea mission, it still continued to fly "Joker" night-reconnaissance and Photographic Reconnaissance Unit (PRU) day missions. Redtail





**ABOVE** Mosquito NS651/"F", nicknamed Woodpecker's Delight, came to grief in a take-off accident on March 5, 1945, in which the undercarriage collapsed at the beginning of a 25th BG(R) mission while being piloted by Lt James C. Evans. The Mosquito was fast and agile, but could be a handful on take-off and with an engine out.



**ABOVE LEFT** Much valuable information on the Würzburg radar was obtained through investigation of captured examples, such as this Würzburg D being tested by the 16th Reconnaissance Squadron, which incorporated a Quirl (Whisk), a conical spinning offset dipole receiver fitted to the dish (ABOVE RIGHT) to improve accuracy.

**BELOW** A 25th BG(R) Mosquito banks over an unknown airfield, possibly while up on a check flight from Watton. Opened as a Bomber Command airfield in 1937, Watton was turned over to the USAAF in 1943, when a concrete runway was built. It reverted to RAF use after the war and flying activities continued there until as late as 2012.

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**ABOVE** Hatfield-built Mosquito PR.XVI NS519/"P" was one of the 653rd BS's original chaff-equipped aircraft. Previously fitted with an H2X radar installation, NS519 flew seven operational Graypea missions before being involved in a non-fatal accident during take-off at Watton in the hands of Lt Morton Hunt on December 27, 1944.

visual reconnaissance missions were transferred to the 653rd BS. In March 1945 the 654th BS flew 33 Graypea missions with 134 Mosquito sorties supporting 1st, 2nd, and 3rd AD missions against Germany, flying nearly every day, and in 11 instances supporting two missions per day. To support this threefold increase in sorties, 12 additional chaff-capable Mosquitoes started operations in March. Overall, the 654th BS had 33 Mosquito PR.XVIs and three T.IIIs on strength, 90 per cent of which were operational. Also in March it was decided to equip some of the Graypea aircraft with cameras, to enable pre- and post-strike imagery, these Mosquitoes carrying one or two F52 cameras.

## REFINEMENTS AND LOSSES

Having accrued three months of experience in flying chaff-screening missions, the 25th BG started to modify its tactics to suit the mission better. A new formation was devised which provided the lead bomb groups with the maximum amount of screening cover. Just before dispensing, the Mosquitoes formed up line-abreast, the aircraft spread out approximately 150–300yd. As they proceeded with their "S-turn" run from the IP to the target, the screening leader called out heading changes every 15sec to enable the Mosquitoes to "S-turn" in unison. The number of Mosquitoes assigned to a mission varied from three to six, based on the distance from the IP to the target, and whether bombing was being undertaken in squadron or group formation. The chaff-dispense rate depended on the length of the run; the density of the chaff trail was regulated by the number of aircraft and length of bomb run.

The first operational loss of a Graypea Mosquito occurred on March 20, 1945, when PR.XVI RF996 was lost on its first mission over Germany. The

loss was attributed to a mechanical cause — double engine failure over Germany. That did not mean the skies over Germany were safe, however; in fact, the threat posed to Graypea Mosquitoes by the Luftwaffe increased that month. Previously, Flak had been the only danger posed to the 25th BG crews. Being at the leading edge of the chaff cloud, the aircraft attracted more than their fair share of AA fire; but, other than a few holes in the aircraft, there had been no losses.

The first time German fighters had been seen by Graypea Mosquitoes was on February 14, when three Focke-Wulf Fw 190s were noted flying near the bomber stream but not acting aggressively. It was not until mid-March that a Luftwaffe fighter made an attack. On March 18, after completing their chaff mission over Berlin, the Graypea Mosquitoes were attacked by one Me 262 that made two gun passes against the 654th BS aircraft before breaking away. No damage was sustained by the Mosquitoes on that occasion, but two days later another Me 262 attacked a Mosquito after the bomb run on Hamburg, as related at the beginning of this article.

In April 1945 the Luftwaffe fighter force continued to make its presence known to the Graypea Mosquitoes. On a mission to Orienburg on April 10, a lone Messerschmitt Bf 109 was observed over Steinhuder Meer as the Mosquitoes were completing a rendezvous with the bomber force. The fighter turned aggressively towards the Mosquitoes, which dived into a conveniently located cloudbank and lost the enemy aircraft. After the bomb run, a single Me 262 attacked from the starboard rear quarter. The Mosquitoes made a sharp turn to starboard as the jet skidded by and the Luftwaffe jet fighter was rapidly engaged by five North American P-51s of the escort force.

A week later, on April 17, six to eight Me 262s



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**LEFT** *Flak was an ever-present danger for the Mosquitoes of the 25th BG(R). Here Lts Tunnel and McCarthy of the 654th BS pose beside their damaged aircraft with a feathered propeller after a shrapnel hit to the port engine nacelle.*

**BELOW** *When Lts Gilbert and Spoerl were attacked in RF992“R” by an Me 262 on March 20, 1945, the latter took the outer section of the port wing off, although the pair managed to return safely. Friendly fire actually posed a greater threat to the 25th BG than enemy fighters.*



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were observed by the 654th BS crews circling near Dresden but they did not engage the Mosquitoes, instead engaging the bomber force. The second operational Graypea loss also occurred in April, when NS650 diverted to Sweden and internment after oil pressure dropped to zero in one engine on the 3rd. Another operational Graypea loss for the month occurred on April 9 when NS792 was declared missing in action, the aircraft last seen under control in the target area with no cause for loss attributed in official records. Mosquito RG113 had also been lost three days earlier, when it crashed on landing on returning early owing to a failed engine.

Six additional chaff-capable Mosquitoes started operations in April, allowing the 25th BG to continue its high tempo of operations, even with the losses sustained during March and April. Some 23 Graypea missions totalling 103 sorties with four aborts were flown in April. Ten of the missions had five Mosquitoes assigned and one had six. Although most missions were to Germany, three were flown to Royan in France. The last Graypea mission of the war was flown to Pilsen, Czechoslovakia, on April 25. No operational Graypea missions were flown in the last two weeks of the war.

## POSTSCRIPT

In total, 28 Mosquito PR.XVIs were used for operational Graypea chaff-dispensing missions. The chaff-modified Mosquitoes averaged 13 operational sorties each, although NS512 and NS743 each flew 36 sorties over Germany. Three were written off in take-off or landing accidents and three were lost on sorties over Germany.

Considering their exposed position at the spearhead of the bomber stream, the Mosquitoes had surprisingly few encounters with Luftwaffe fighters, a testament to the dominance of USAAF fighters at this point of the war. Only four attacks were made on Graypea aircraft, three by solitary Me 262s, resulting in damage to one 654th BS aircraft. Flak was a greater danger to the Graypea Mosquitoes, encountered on many missions but again, other than a few holes in the aircraft, there were no known losses. Two of the three losses that occurred over Germany were not attributed to enemy fire but to mechanical issues, leaving only one possible operational loss to enemy action — NS792, which went missing on April 9.

Defensive fire from American bombers probably posed as big a threat to the Graypea Mosquitoes as the Luftwaffe. On at least four missions in March and two in April, Mosquitoes were fired at by bomber crews. Although the Mosquito was a comparatively uncommon airframe to the gunners, the Graypea examples had bright red tails as a recognition feature to alleviate

## DE HAVILLAND MOSQUITO PR.XVI DATA

**Powerplant** 2 x 1,710 h.p. Rolls-Royce Merlin 76/77 liquid-cooled V12 piston engines driving three-bladed de Havilland constant-speed fully-feathering propellers

### Dimensions

Span	54ft 2in	(16.51m)
Length	44ft 6in	(13.56m)
Height		
tail down	12ft 6in	(3.81m)
tail up	17ft 5in	(5.31m)
Wing area	454ft <sup>2</sup>	(42.18m)

### Weights

Empty	14,635lb	(6,638kg)
Maximum take-off	22,350lb	(10,138kg)

### Performance

Maximum speed	408 m.p.h.	(657km/h)
Cruising speed	250 m.p.h.	(402km/h)
Initial climb	2,900ft/min	(880m/min)
Service ceiling	38,500ft	(11,700m)
Maximum range	2,450 miles	(3,940km)

this problem, but in the heat of combat this did not always help. Another friendly threat to the Mosquitoes was escort fighters. On a mission to Halberstadt on April 8, 1945, between the rendezvous point and the IP, four P-51s turned head-on to engage the Mosquitoes, with one actually starting a firing pass. Eight days later a Mosquito returning to Watton was attacked by a P-47 west of Frankfurt. After the first gun pass, the Mosquito pilot simply opened up his throttles and outran the Thunderbolt.

No operational research has been unearthed that can prove with certainty the direct impact of the chaff-screening force. Anecdotal evidence from Graypea crew debriefs, however, does link Flak engaging either the Mosquitoes or the chaff cloud rather than the lead bomb group on most occasions. Operational analysis studies of chaff protection undertaken in 1944 showed that on five out of six missions chaff-protected aircraft experienced a reduction in major damage when compared to their non-chaff-protected counterparts. This aligns with Eighth AF tests performed in October 1944, which revealed a 15 per cent reduction in losses for units that were protected by a chaff screen.

Whatever the numbers, the presence of the 25th BG Mosquitoes undoubtedly allowed the lead bombardiers and navigators to concentrate on their job more fully and ensure mission success; more importantly, they saved the lives of lead bomber crews. Despite the undeniable personal risk imposed on Mosquito pilots, the Eighth AF's decision to fly Graypea missions paid great dividends for the USAAF.





# FRANCE'S AIR PIONEERS: JEAN DE CHAPPEDELAINE

Continuing his series on “those magnificent Frenchmen” who risked their reputations, fortunes — and often lives — to further the cause of aviation across the Channel, French aviation historian **JEAN-CHRISTOPHE CARBONEL** describes the work of former artillery officer Jean de Chappedelaine, who explored the use of centrifugal force as a means of creating lift

**C**OUNT JEAN LOUIS Marie Olivier de Chappedelaine was born on September 26, 1893. After serving as a lieutenant in the 237<sup>e</sup> Régiment d'Artillerie in the First World War (during which he was gassed at Ypres), he developed a fascination with aviation, and went on to become a co-founder of the French aeronautical magazine *Les Ailes* in 1921. As an aircraft designer, de Chappedelaine was unsuccessful, ultimately becoming a translator for the International Civil Aviation Organization. He died on February 23, 1950. Recognition came only after his death, *Les Ailes* describing him in its obituary as “among the first French scientists to investigate jet propulsion”.

## EARLY DAYS

In 1916 de Chappedelaine applied for a patent describing a “craft which uses only the centrifugal forces produced by its working for propulsion, lifting [it] into the air and hovering in it”. This “lift engine” was hermetically sealed, i.e. not open to the surrounding air. In July 1921, in the fourth issue of *Les Ailes*, de Chappedelaine presented a developed version of his theories, promoting a type of vehicle which would be popularised some 60 years later in the movie *Blade Runner* (but which still remains unrealised as an actual flying-machine today); de Chappedelaine explained:

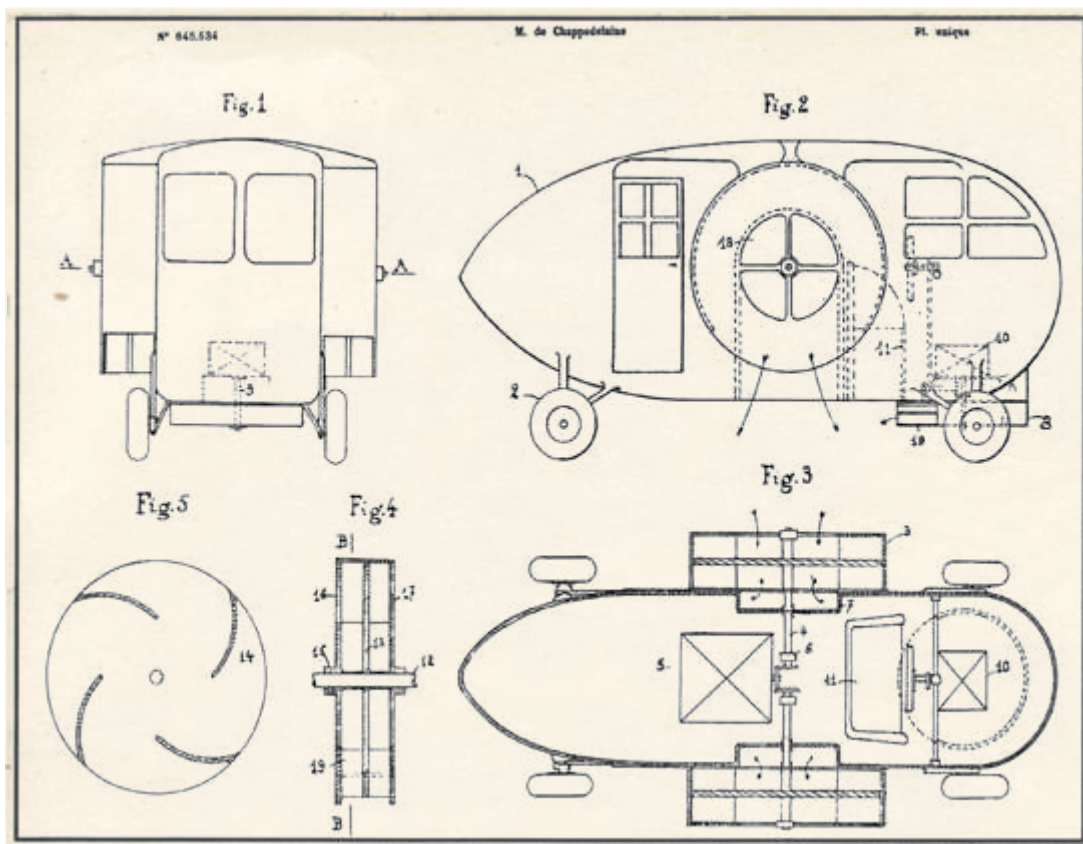
“While I have followed with great interest the progress in aeroplanes and helicopters, and noted the prodigious results obtained, I am convinced the methods used are only second-best. Aviation will only become practical when aircraft have the following features: the ability to take off vertically and hover in mid-air, and compactness. This has led me to think of using centrifugal force to escape the force of gravity.”



On June 22, 1921, de Chappedelaine presented his paper, entitled *Centrifugal Force and Gravity*, to the *Association Française Aérienne* (French Aerial Society) as a prelude to its publication in *Les Ailes* the following month. In it, he states:

“A gravitational field and a centrifugal field are both acceleration fields; the weighting mass [sic] of the first is no different from the inertial mass of the second. An experiment profoundly

**ABOVE** A portrait of Lt Jean de Chappedelaine during his service as an artillery officer in the French Army during the First World War. Little seems to be known about de Chappedelaine beyond his aeronautical work, other than that he died on February 23, 1950, and is buried beside his wife, Countess Vera Sangster, in Cheboygan, Michigan.



imprinted on my mind is the 'looping-the-loop' toy I had when I was a youngster. In this toy, a small [model train or cyclist] follows a circular trajectory and at some point just hangs in the air without any obvious support".

His idea was to move air inside a form of centrifuge rotating along a horizontal axis. In this way, he thought, the centrifugal effect directed upward inside the spinner, could oppose the weight of the aircraft to which the centrifuge was attached. Whenever this effect became superior to the weight of the machine, the aircraft would ascend. The conclusion of his paper was optimistic: "If we suppose that everything in the machinery is airtight, and if we set aside the friction coefficient of the walls of the centrifuge — a theoretical hypothesis, I admit — then we can deduce there is no need to use any workforce to lift a body in the air. Known mechanical laws tell us that work is the product of a force and a displacement. If there is no displacement, then the required work becomes null. If, as we are led to believe, experiments confirm the promises of calculation, then the question of aerial flight is solved mechanically. The dream of Icarus will be realised and human flight, from the theoretical possibility of today, will become an established fact".

The article in *Les Ailes* was strongly criticised

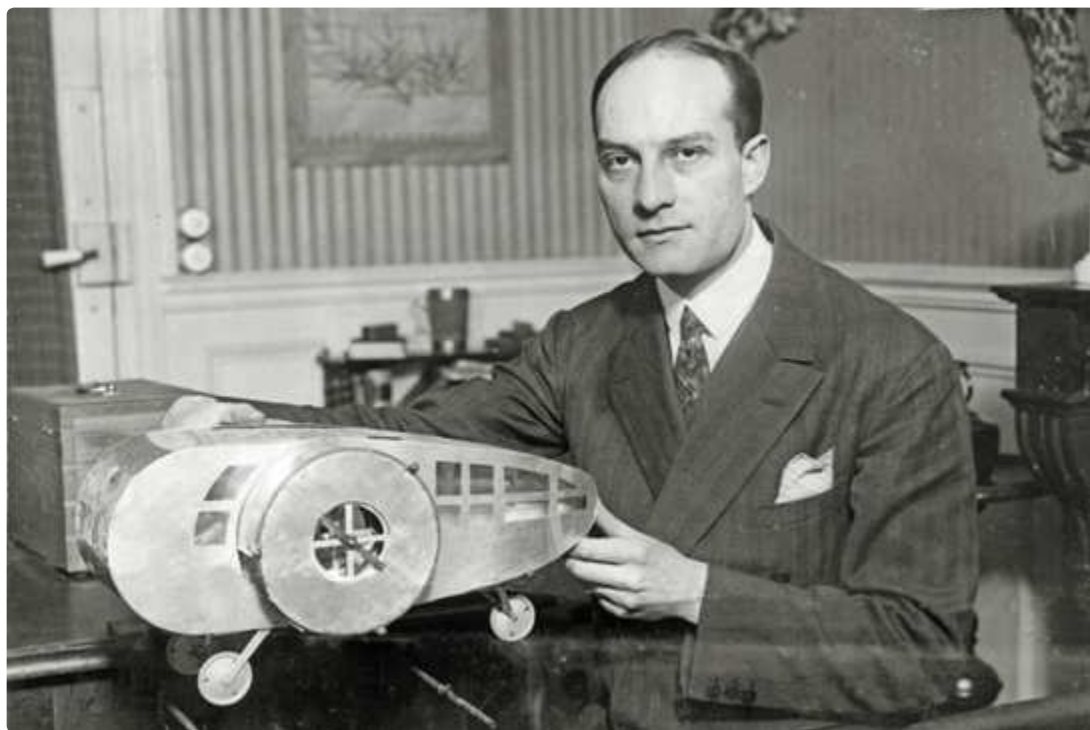
**ABOVE A drawing from French patent FR645 534 for de Chappedelaine's Gyraptère concept, its resemblance to an automobile emphasised by the four-wheel undercarriage. The machine consisted of two turbo blowers located on either side of a wingless stubby fuselage, the blowers ejecting air downward and aft, providing lift and propulsion — in theory.**

by Raymond Pris, *Ingénieur* at the *Institut Aérotechnique de Saint-Cyr*:

"The best demonstration of the inadequacy of this theory is given by the author himself in his conclusion. A vehicle rolling on a horizontal road does not need any effort (beside passive resistance) to conserve its speed, because, naturally, the force of gravity is counteracted by the ground. It is just not possible to do the same with a body alone inside a fluid like air; it is necessary to generate by some work a fictional ground on which the said body could repose. Claiming the opposite amounts to claiming it is possible to create something without exchanging any energy . . . stored in materials. This is akin to a God-like power. The author's mistake is to take out of the equation the many static forces which nullify the lifting effect of the centrifugal forces."

When it came to the reality of designing a lifting device, however, as described in his patent dated April 15, 1926, de Chappedelaine actually used the action/reaction principle rather than





**ABOVE** Jean de Chappedelaine at his desk in 1928, holding the  $\frac{1}{10}$ th-scale model of the Gyraprère he built to demonstrate proof of his concept. On the desk to his right is the small box containing the 0-14 h.p. electric motor the inventor used to power the model. The power loading of the model could reach 9lb/h.p. based on static thrust.

a centrifugal effect, despite its title — *appareil sustentateur ou propulseur à force centrifugale* (lift-generating or propulsive apparatus using centrifugal force). In this design, the airflow was sucked through side intakes and ejected through an underside slit. The patent explains:

“This mass of [expelled] air acts upon the surrounding air. This reaction combines with the pressure [caused by a rotor compressing the air from the intake] to result in a force which moves the aircraft upwards or forward.”

This is obviously a form of primitive jet engine, although the airflow was not heated and/or burnt, just compressed. In late 1928 de Chappedelaine himself described the working principle of his machine as “direct reaction on the surrounding air of the air expelled from the turbines, along the principle of the rocket”.

## PROVING THE THEORY?

The following year de Chappedelaine applied for a new patent, dated December 10, 1927. This describes a complete aircraft, “to solve some problems so far impracticable, like lifting off vertically from a single point above the ground or the sea, hovering for a defined time, while maintaining the ability to move in the air in every direction, to land on the ground or [alight] on water without any damage to the machine”. In this new wingless design, two side-mounted turbines were used for lifting

REGARDING THE NAME *Gyraprère*, de Chappedelaine commented in *Meccano Magazine*:

“Originally I named my machine *Gyroptère*, but this name did not appear appropriate. To reply to the rather justified criticisms voiced by some in the press, I thought it wise to replace the ‘o’ with a ‘privative a’ and rename it ‘Gyraprère’, which is more appropriate for an aircraft without wings.”

Etymologically speaking, the word *Gyraprère* is derived from two greek words: “gyros” = rotating; and “pteros” = wing, the privative-a replacing the “o” in *Gyroptère* (rotating wing) changing the meaning to “rotating without wings”.

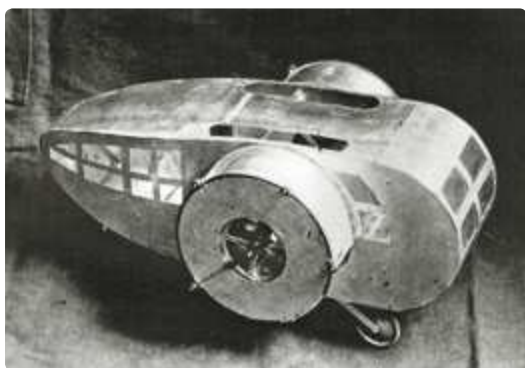
After perusing numerous magazines and newspapers, I have not been able to find any mention of these “criticisms” of the name *Gyroptère* which de Chappedelaine mentions.

Curiously, in 1947 *Les Ailes*, in its summary of de Chappedelaine’s aeronautical activities, called the machine the “Turbavion”. The name, associating “turbine” and “avion” (aircraft), would certainly fit the machine. However, I could not find any 1927–28 source featuring the latter name. **JCC**

power and a smaller chin-mounted turbine was installed for propulsion. Rather optimistically, de Chappedelaine thought that in case of engine failure, by declutching the engine, the inertia of the rotors would maintain a downward airflow for enough time to allow the aircraft to land safely. In flight, de Chappedelaine believed, the



**LEFT** A poor-quality but extremely rare photograph, first published in the September 15, 1928, issue of *L'Air*, showing de Chappedelaine operating the test rig of the Gyrap্তère scale model, apparently in captive flight, powered by a flexible drive from the electric motor housed in the box in front of de Chappedelaine. Surely the flexible drive would have had to be a lot longer to make the full-size machine a success!



**ABOVE** The inlets of the blowers were reportedly connected to the upper surface slots in order to use boundary layer suction as a means of reducing drag.

gyroscopic inertia of those same rotors would induce stability in the aircraft, aerodynamics alone being insufficient.

At the beginning of 1928 de Chappedelaine put his theories to practical purpose by building a  $\frac{1}{10}$ -th scale model of the machine, which he named *Gyrap্তère* (see panel on page 34).

The model was made of aluminium and bronze and weighed 750g (1.7lb). This was not just a demonstration model but a replica of the final machine, fitted with undercarriage and even windows. However, to keep the weight down, the 0.14 h.p. electric motor used as a powerplant was sited remotely, delivering its power via a flexible transmission cable.

According to a report in the French aeronautical journal *L'Aérophile*, the experiment was a complete success: "The  $\frac{1}{10}$ -th scale model has fully confirmed theoretical calculations. When the turbines were activated, the model lifted from the ground and just hovered there . . . while the turbines ran at 7,000 r.p.m."

According to a document dated July 1928, discovered in the *Musée de l'Air* archives, de Chappedelaine's views on the safety aspects of his machine had slightly evolved:

"In case of engine failure, the safety of the machine lies in the ability of the turbines to permit autorotation during the descent. The rotors then work as per a Savonius paddlewheel (vertical-axis wind turbine with curved

blades) to use the Magnus effect. The drag of a paddlewheel is seven to eight times greater than that of an aeroplane's wing, which is why we can build Gyrap্তères with a span seven or eight times less than today's aircraft, while maintaining the ability to descend safely in case of engine failure."

While this seems both wildly optimistic and possibly aeronautically illogical, de Chappedelaine furthermore suggested in the daily newspaper *L'Intransigeant* that, while altitudes of 3,000m–4,000m (9,800ft–13,100ft) could be obtained, a more common use of the Gyrap্তère would be to make nap-of-the-earth excursions; an altitude of 15m (50ft) is quoted. In the latter case, the time required to land would be very short, which may explain why he thought autorotation and inertia would be sufficient to power the descent. The inventor may have been prompted to have second thoughts about the emergency operation of the machine, as he suggested another option; to incorporate a small auxiliary engine using compressed air to power the turbines during the few minutes required to land safely.

The search for compactness was another early key to de Chappedelaine's research, the inventor remarking: "The footprint of a Gyrap্তère can be reduced to the point where it would be within the *Code de la Route* [Highway Code] requirements for ground vehicles". The brochure is even more to the point: "[Its] small footprint makes the Gyrap্তère nearer to an automobile than to an aircraft". This struck a chord with the press, including mentions in *Les Annales*, *Le Courrier Maritime* and others, which were quick to label the machine *une voiture volante* (a flying car). Some even joked about it: "[The Gyrap্তère] is said to be a flying car. When we come upon a congested crossroads, we will simply overfly it!".

## MODIFICATIONS

An appendix to the initial patent, applied for on June 28, 1928, indicates that the model tests had revealed a few problems. As a result the turbines were enlarged, as were the air intakes. Additional intakes were located in the roof of the fuselage, supposedly to cool the engine, but it seems likely these were also intended to contribute to the lifting system. The upper intakes are prominent on a photograph of the model, and one may guess that an early test of the model without them demonstrated that there was insufficient thrust to lift the aircraft.

## 1928 GYRAPTÈRE DATA

SOURCES FOR technical data for the Gyrap্তère are unsurprisingly scarce, and the information presented here has been culled from various sources: the dimensional data is from Jacques Mortane's article in *Les Annales*; performance data is from *La Jeunesse* (confirmed in *L'Intransigeant*). The engine, crew and weight data here is from the August 16, 1928, issue of *L'Intransigeant*

**Powerplant** 1 x unspecified 240–250 h.p. engine

### Dimensions

Length	4.8m	(15ft 9in)
Width across turbines	2.4m	(7ft 10in)
Diameter of turbines	1.5m*	(4ft 11in)
Width of turbines	0.6m	(1ft 11in)

### Crew

2

### Weight

1,100kg (2,425lb)

### Performance (estimated!)

Speed	500km/h	(311 m.p.h)
Service ceiling	4,000m	(13,000ft)
Endurance	4hr	

\*1.8m in *L'Intransigeant*

Another modification was the removal of the chin-mounted propulsion turbine, in favour of “movable flaps, with a system controlled via a wheel in the pilot’s cockpit, which would modify the air exhaust opening at will, so that both lift and propulsion could be provided in all aspects”. Today these devices would be named jet deflectors or louvres.

The aforementioned article in *L’Aérophile*, while largely optimistic, made it clear that “numerous questions remain to be explored on a full-size machine, notably the gliding descent”. In the August 1, 1928, issue of *Les Annales*, aviation journalist Jacques Mortane wrote an enthusiastic article about the machine and its inventor:

“I will tell you a secret, but don’t laugh; I have just seen a machine which, without any wings or propeller, flies up and down, forwards or sideways, and hovers in mid-air. Obviously it is just a model. But the big thing is that it works. Whether this flying car is 50cm or 10m long is of no importance. Size does not matter.”

At the end of the interview, de Chappedelaine himself becomes rather philosophical and waxes lyrical about his invention: “I think a practical means of transport . . . will allow people better to get to know and appreciate each other. I hope my invention will bring about a closer understanding and a complete *rapprochement* between peoples”. To this Mortane adds: “This is what we can expect of the Gyrap্তère if wise patrons allow the inventor to build his machine full size”. The inventor continues, happy to promote the day when his machine will be in common use everywhere: “If we look to the future, we can envision a time when gyrap্তères will be a commonplace transport; houses will all be built with terraced rooftops [for landing]. Department stores, banks, even communal housing will have landing pads on their rooftops, with a garage for the machines. This will be an excellent solution to decongest the streets of our cities. Furthermore, the ease with which anyone will be able to travel over great distances will decentralise the cities: the businessman will leave his country house to land on the flat top of his office building”.

## AN IDEA AHEAD OF ITS TIME?

Yet de Chappedelaine was also conscious of some of the less desirable side-effects the wide availability of Gyrap্তères might have on society:

“The ease with which a Gyrap্তère could dock at any level of a house could lead to a few drawbacks. It would be better not to leave windows open, for example, even on the fifth storey, if one does not want to tempt robbers into using such a vehicle! I hope architects will not find it necessary to put bars on all windows.

There could also be considerable difficulties for the customs authorities: with such an aircraft, which could land stealthily virtually anywhere, such authorities will be rendered inefficient.”

Such visions of the future continued into the 1940s and 1950s, with other inventors and manufacturers around the world promoting the concept of the “helicopter/VTOL aircraft in every garage,” like Hiller in the USA and von Zborowski in France. Indeed, the idea of the flying taxi remains very much with us. A handful of well-funded startups, some backed by major aviation and car companies, have already undertaken test flights of electric vertical take-off & landing (eVTOL) aircraft. Piloted air taxi and shuttle services are expected before 2025, and Uber says it expects to be operating aircraft without pilots by around 2030.

Asked by journalists when he expected to see a full-size Gyrap্তère being built, de Chappedelaine replied: “I don’t know yet. I wish I could build it in France but I fear I will not receive enough funding here and I must admit to having received interesting offers from the Americas”. Ultimately, the full-size machine was never built. The Frenchman’s mind was already on his next invention, for which he had managed to get funding from the *Service Technique de l’Aéronautique*. So this is the end of the story for the Gyrap্তère — but the beginning of the development of the *Aérogère*, to be covered in these pages soon . . .



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# A GRAND ILLUSION?

## THE RAF & THE SPEY MIRAGE IV, 1965

With the cancellation of BAC's state-of-the-art TSR.2 strike bomber in 1965, the RAF was left with a hole in its plans for a replacement for its ageing Canberra force. Might France's Dassault Mirage IV nuclear bomber, fitted with a British engine, fill the gap? Technology, politics and economics conspired against it, as **THOMAS WITHINGTON** explains

**I**N APRIL 1965, in the blink of an eye, what was then one of the world's most advanced combat aircraft became an instant museum piece, when the state-of-the-art TSR.2 strike/reconnaissance aircraft was cancelled by the recently elected Labour government, led by Harold Wilson. Cost overruns during the aircraft's development had sealed its fate. Yet scrapping the TSR.2 did not scrap the need for a medium bomber to equip the RAF as a replacement for its English Electric Canberra series: "The RAF requires an aircraft which will drop conventional weapons with great accuracy at low level, operating if necessary from poor-quality forward airstrips", noted an August 1965 Ministry of Defence (MoD) draft

press release, announcing the decision to consider France's Dassault Mirage IV medium bomber as a Canberra-replacement contender.

### **British power for France's big delta**

The Mirage IV had entered service with the *Armée de l'Air* (AdA — French Air Force) on October 1, 1964, and was in the running to replace the RAF's Canberras alongside the USA's General Dynamics F-111K and the homegrown Blackburn/Hawker Siddeley Buccaneer S.2. A joint BAC/Dassault proposal suggested the Mirage IV be equipped with Rolls-Royce RB.168-25R Spey turbofan engines in place of the aircraft's standard Snecma Atar 9K-50 turbojets. As with the Anglo-French Concorde supersonic airliner project, construction

**BELOW** *Mirage IVA 03 — the third pre-production prototype of the standard nuclear bomber — roars away at the Paris Air Salon under the full power of its pair of Snecma Atar 9K turbojet engines in June 1967. The prospective British plan was to re-engine the majestic delta bomber with a pair of Rolls-Royce RB.168-25R Spey turbofans.*

MIKE HOOKS



# Mirage (mira'3/) *n.*; an optical illusion caused by unusual atmospheric conditions...



DASSAULT VIA JEAN-CHRISTOPHE CARBONEL

**ABOVE** *The first Mirage IV prototype, 01, was essentially a scaled-up two-seat version of the Mirage III fighter, but smaller than the later production-standard Mirage IVA. The prototype made its first flight on June 17, 1959, reaching Mach 1.9 the following month. Note the original fin; the chord was increased on subsequent prototypes.*

of which began in 1966, it was proposed that one production line in each country would assemble the RAF's Mirage IVs.

It was clear from the outset that the baseline Mirage IV would require significant modifications if it was to meet RAF requirements. A letter from Air Vice-Marshal (AVM) Reginald Emson, Assistant Chief of the Air Staff for Operational Requirements (ORs), to Air Chief Marshal (ACM) Sir Charles Elworthy, Chief of the Air Staff, dated June 18, 1965, highlights some of the concerns regarding the Mirage IV in its then-current form. The most significant of these was that the RAF wanted a low-level bomber, a flight profile the Mirage IV was not at that time configured to support. The latter was equipped with a Plan Position Indicator (PPI) radar, which scanned directly downwards, as opposed to the forward-scanning radar the RAF needed to perform low-level flight at high speed safely.

Emson stated that at low altitude the Mirage IV could achieve a 570-nautical mile (1,050km) radius of action when travelling at 400kt, with a single 100-mile (180km) dash at 566kt, with droptanks. At high altitude, with a one-way dash of 200 miles (370km) at 1,133kt and the rest of the sortie being flown at 600kt, the aircraft would have a 1,180-mile (2,180km) radius of action when using droptanks. He stated that "our present advice is that the Mirage IV would have to be strengthened for low-level work", adding that "it has not met our radius of action requirements, nor would [it] appear to have a satisfactory equipment fit".

Further shortcomings were raised by Emson following a presentation on the aircraft's suitability for the RAF given by Dassault and BAC on July 16, 1965. The good news was that equipping the aircraft with the Spey was considered feasible, albeit with a weight increase of some 1,800lb (820kg). The bad news was that Emson and his team felt that, unmodified, the Mirage IV could not meet the RAF's need for a 1,000-mile (1,850km) combat radius when carrying a 2,000lb (900kg) weapon without droptanks or inflight refuelling. The aircraft also fell short of a second requirement, which was to fly for 750 miles (870km) entirely at low level at speeds of 600kt unrefuelled. Another bit of good news, however, was the claim made by Dassault and BAC that the aircraft could in fact achieve a continuous minimum altitude of 500ft (150m) above ground level (agl) at high speed without the need for additional strengthening.

## Radar requirements

One potential solution to the radar problem was to employ the French CSF Cyrano II dual-mode air/ground radar suite fitted to the Mirage III series of combat aircraft on the RAF Mirage IV. However, the British evaluation team stressed that the radar had no all-weather capability when used below 500ft, and that it could not perform simultaneous terrain-following and target-fixing. This was an obvious problem when the aircraft would need to fly a nap-of-the-earth (NOE) flight profile when approaching its target. Target





**ABOVE** Fitted with auxiliary fuel tanks under each wing, Mirage IVA 03 shows its belly to the crowd at Paris in June 1967, revealing the distinctive circular radome for the Thomson-CSF "Radar Panoramique" just aft of the intakes. Behind it is a dummy AN-11 nuclear round, carried semi-recessed within the underside of the fuselage.

fixing was further hampered by the aircraft being unable to perform visual bomb-aiming. This could be remedied only by a redesign of the forward canopy, and the installation of a terrain-following head-up display (HUD).

Emson's assessment continued. The Mirage IV could only operate from standard Nato paved runways and was limited to a maximum take-off weight of 80,000lb (36,360kg), of which a maximum of 8,000lb (3,640kg) would be ordnance. The runway issue was a particular cause for concern given that the RAF wished to operate its new bomber from austere bases. Then there was the question of cost. Dassault had estimated a price tag of £1.5m per Mirage IV fitted with a Spey engine. Just adding a navigation system capable of meeting RAF requirements for low-level flight would take the price to £2.2m per unit, considered by a Ministry of Aviation (MoA) report to be comparable with the unit price of the F-111. Moreover, the completion of the development of the Mirage IV to RAF standards was not expected to be possible before 1970 at the earliest.

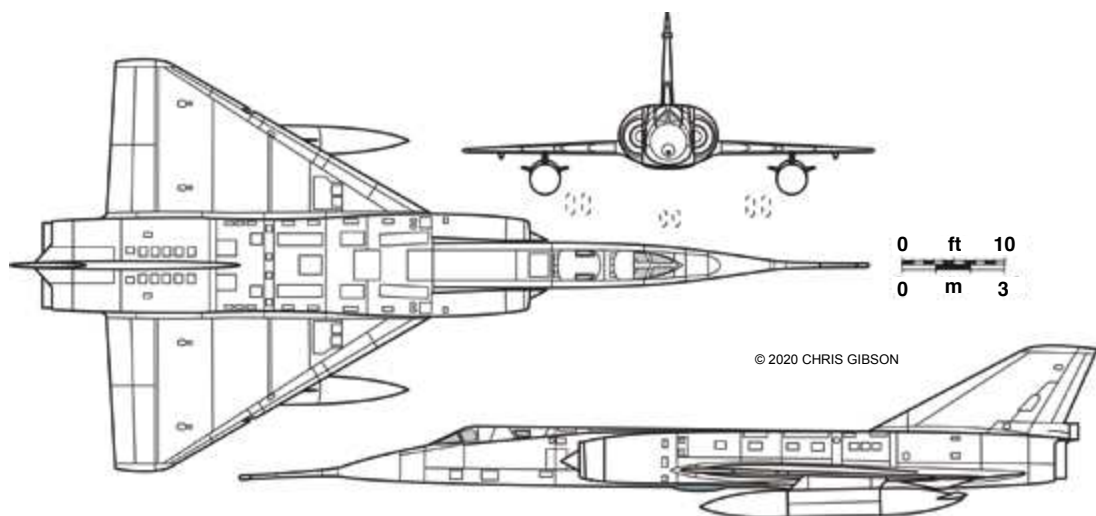
In September 1965 British test pilots from the Aeroplane & Armament Experimental Establishment (A&AEE) at Boscombe Down got their hands on a Mirage IV at the *Centre d'Essais en Vol* (CEV — Flight Test Centre) at Istres in southern France. Despite being summarised as "brief and superficial", according to the official report, only yielding around 14 flying hours on the jet, "the trial enabled the team to form a provisional opinion" of the aircraft. The Mirage IV's handling and ride-comfort at altitudes down to 200ft (60m) at up to 633kt got a thumbs-up. While it was deemed necessary to strengthen the airframe and improve the view of the pilot and navigator, "the brief flight trial revealed no major shortcomings".

Yet shortcomings were certainly noted in other areas. The team stated that the proposed marriage of the Mirage IV with the RB.168-25R Spey would be unable to meet the RAF's requirements for low-level flight, airfield performance and HI-LO-LO-HI flight profiles. While fitting the aircraft with the Spey was not seen as insurmountable, the team warned that considerable structural

**By the time 03 was displayed at the 1967 Paris Air Salon, as seen here, the prospect of the Mirage IV in service with the RAF had passed. The type played a significant part, however, in prompting French withdrawal from Nato's military structure in 1966, the Mirage IV giving France the ability to create a nuclear deterrent of its own.**

MIKE HOOKS





**ABOVE** The Spey Mirage IV, a three-view of which is seen here, was a prospective development of the proposed IVO variant intended as a Canberra replacement for the Royal Australian Air Force. The latter remained unconvinced by the big delta, describing it as an “old-fashioned aircraft that merely flies fast into waiting SAMs”.

modifications would be required and that “these could give rise to unforeseen development problems”. Further structural testing and fatigue calculations were recommended before the suitability of the airframe for low-level flight could be confirmed.

Required avionics enhancements beyond the addition of a forward-looking radar included a new navigation system to support the RAF’s operational requirements and to ensure that the aircraft was not confined to high-altitude nuclear attack, as was the case for the Ada’s Mirage IVs. New communications systems were also required, and the aircraft would need to be reconfigured to operate from short runways. The team calculated that this would incur research and development costs which were unlikely to fall below £50m.

## Falling short

An October 1965 RAF report on the Mirage IV echoed many of the concerns articulated in the assessment drafted by the MoA. A lack of terrain-following equipment restricted the Mirage IV in its current form to low-level altitudes of 500–1,000ft (150–300m) agl in low visibility. The PPI radar would, at best, provide a circular error probable (CEP — a scientific measurement of precision delineating the radius of a circle in which at least 50 per cent of munitions delivered will land) of 1,300ft (400m) from a height of 500ft agl, which compared unfavourably with the RAF’s 700ft (200m) CEP requirement from the same altitude. The aircraft was judged to be capable of releasing ordnance only when flying straight and level, and had a blind-bombing CEP of 2,000ft (600m) compared to the 1,200ft (360m) CEP required by the RAF. The latter echoed similar concerns regarding the aircraft’s lack of blind-bombing equipment. The solutions

proposed by the RAF included the installation of the French CSF Antilope radar system, then being trialled on Dassault Falcons (and which would not enter service until the early 1980s), which could perform simultaneous terrain-following and ground-mapping, as well as a visual bomb-aiming sight housed in a HUD, an accurate weapon-aiming computer and a reliable altitude-referencing system.

Reflecting these shortcomings, BAC revised its proposals regarding the Spey Mirage IV concept, and proposed a redesign, concurring with the RAF on the use of the French Antilope radar. As mentioned, the company proposed co-production of the aircraft by BAC and Dassault, with delivery of the first 16 RAF aircraft to be made by April 1970. The MoD believed that a delivery date of October 1970 was more realistic, and expressed concern that the government would have to commit to buying a production run of aircraft “before satisfactory proofs could be demonstrated in prototype and development flying”.

The revised BAC proposal saw the company put development costs for the aircraft at £27.5m, although the government felt this estimate was rather low. Instead it expected the research and development programme to cost at least £50m. The MoD’s view, that BAC’s predicted unit costs were too low, argued that a unit price of £2.45m for 70 aircraft was more realistic once the government’s predicted research and development (R&D) costs were taken into account. Furthermore, the government calculated that around half the costs for R&D and production would benefit French — as opposed to British — suppliers.

Another concern was that forging ahead with the Spey Mirage IV design could negatively impinge upon another project: the Anglo-French Variable Geometry (AFVG) aircraft, established



**ABOVE LEFT** Sir Paul Gore-Booth, Permanent Under-Secretary of State, Foreign Office, during 1965–69. **ABOVE CENTRE** Denis Healey served as Secretary of State for Defence from October 1964 until June 1970. **ABOVE RIGHT** Michael Stewart served twice as Foreign Secretary, first during 1965–66, and again from October 1968 to June 1970.

to develop a “swing-wing” combat aircraft, also involving BAC and Dassault. [See Professor Keith Hayward’s AFVG: “A Political Problem for Both Sides” in TAH31 — Ed.] The British government was concerned that precious little funding would be available to continue with the AFVG project should the UK commit to the Mirage IV.

## The politics

Consideration of the Mirage IV for the RAF immediately triggered worries regarding the UK’s relationship with the USA. On April 9, 1965, the British government and the American administration of President Lyndon Johnson had signed an “arrangement”, with London agreeing in principle to acquire the F-111. Wilson’s government appeared to have painted itself into a corner. In a letter dated July 15, 1965, Sir Paul Gore-Booth, the Permanent Under-Secretary of State for the Foreign Office (FO), wrote to Sir Richard Way, Permanent Secretary of the MoA, that “although the public announcement of the arrangement spoke of an option [to procure the F-111] . . . the wording of the arrangement is not in the form of an [official] option”. Gore-Booth continued with a warning that “any idea of using a French rather than an American aircraft as our next-generation delivery system for nuclear weapons would have obvious and far-reaching political implications”. Nevertheless, FO legal advice concluded that the arrangement did not formally commit the British government to purchase the F-111.

Additional FO concerns were articulated by Sir Wynn Hugh-Jones, assistant head of the Western Organisation department of the FO, in a letter to Sir Frank Cooper, Assistant Under-Secretary of State at the MoD. The adoption of a French platform for an element of the UK’s nuclear deterrent, “rather than an American aircraft . . . would have very serious political repercussions”, Hugh-Jones’s letter warned: “It would push us into closer co-operation with the French *Force de Frappe* [Nuclear Strike Force], in contrast to the

Atlantic solutions we have so far been pursuing”.

At the time, the USA was seen by much of the British government and civil service as the UK’s security guarantor, and the FO felt that the acquisition of the Mirage IV could potentially weaken American commitments to this end by encouraging President de Gaulle “in his aims of replacing Nato [with] a series of bilateral agreements, and of diminishing the US military presence in Europe”. Above all, it was felt that “the effect on Anglo-American relations could thus be serious” if the UK went ahead with the Mirage IV purchase.

The FO’s worries were crystallised in a minute sent to Secretary of State for Defence Denis Healey from Foreign Secretary Michael Stewart on December 15, 1965, which stated that “the political arguments against adopting this aircraft are overwhelming”. Like Hugh-Jones, Stewart was concerned about the impact that the RAF’s acquisition of the Mirage IV might have on the USA-UK defence relationship, and Nato in general, at a time when the British government perceived its counterpart in Paris as acting against the alliance’s interests in furtherance of its own.

Conversely, there were strong voices sounding caution over any UK decision not to press ahead with the Mirage IV procurement, particularly as regarded future Anglo-French industrial co-operation on defence projects. It is noteworthy that the report by the Committee of Inquiry into the Aircraft Industry by Lord Plowden had recently strongly recommended deepening international co-operation regarding aircraft projects. In a letter dated February 11, 1965, to ACM Sir Christopher Hartley, Deputy Chief of the Air Staff, Air Cdre George Heycock, air attaché to the British Embassy in Paris, warned that the decision to abandon the initiative would lead to “a violent and fatal expression of disgust at our decision”. Heycock warned that the decision to procure the F-111, in the view of the French government, would mean that the UK



## MIRAGE IVA (ATAR)

*The fitting of the Rolls-Royce Spey in place of the original Atar engine, combined with the accommodation of British weapons and systems (based on those of Hawker's cancelled P.1154 V/STOL fighter), would have required considerable changes . . .*

0 ft 10  
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## MIRAGE IVS (SPEY)

*. . . including a 2ft (0.6m) fuselage extension and revised air intakes to handle the Spey's almost 30 per cent increase in mass flow. This stretch would allow the carriage of more fuel, but still not enough to meet the RAF's 1,000 nautical-mile (1,850km) range requirement.*

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would "reduce the viability of our industry [so] that collaboration will in time be abortive against the strength of American competitive products".

The logic of the French government, Heycock argued, was that by encouraging ever-closer collaboration between the French and British aviation industries, the two countries would be able to compete in the global military aviation marketplace against the large American concerns like General Dynamics and McDonnell Douglas. He continued with a warning that abandoning the Mirage IV project posed grave risks for the longevity of the French and British aviation industries. It might also force Paris to look towards the USA to satisfy military aircraft requirements which could no longer be satisfied by the French domestic military aircraft industry: "In such an event [the French] regard [the UK's] future as entirely incompatible with our preservation of [a military aviation] industry other than that of a satellite to the American industry, and as gradually withering away".

Four days later Hartley responded to Heycock's letter, stating that he could not "see how the viability of . . . British industry can be critically dependent on a project which must be largely executed in France if it is to compete in price".

He added that the British were committed to the successful development of the AFVG project and the Anglo-French Sepecat Jaguar ground-attack/trainer aircraft "and that there is no thought of becoming a satellite of American industry. Had we wished this," Heycock continued, "we would already be on the way to negotiating it, and we would never have subscribed to the collaboration projects which are now on the books".

### The outcome

Embarrassingly, news of the Mirage IV's shortcomings in terms of the RAF's requirements had been obtained by *The Daily Telegraph*, which had run an article to this effect in early October 1965. This was picked up by the French press, which translated the gist of the story, leaving Paris in little doubt that the UK was unlikely to proceed with the acquisition of the French bomber, and by the end of 1965 the Mirage IV was out of the running altogether as a Canberra replacement.

Ultimately, the Mirage IV simply needed too much work, which translated into too much expense, to shape it to the RAF's requirements. As an August 1965 draft press statement announcing the Mirage IV decision explained: "It seems unlikely that this aircraft could meet the essential



**ABOVE** The Mirage IV was progressively upgraded throughout its long Armée de l'Air career, changing role from high-altitude nuclear bomber to nuclear-capable low-level penetration strike aircraft and reconnaissance platform. The Mirage IV was finally retired from service in the mid-2000s, the big delta having served for some four decades.

needs of the RAF without a great deal of expensive development". Instead, the British government moved ahead with the purchase of the F-111K. [See Chris Gibson's *Swing-wing London?* in *TAH17* — Ed.] In April 1966 an order was placed for ten F-111Ks, plus an option for a further 40 examples. An initial unit cost of £2.1m was predicted for the variable-geometry fighter-bomber, lower than the government's own prediction for the modified Mirage IV — but these costs did not remain static and began to increase as the F-111 was configured for the RAF's requirements. Healey acknowledged the cost increases that this would bring. When accounting for these modifications, and for inflation, he announced that the F-111K's unit cost was expected to reach £2.7m by the time deliveries were to commence in 1970.

In an ironic twist, the F-111K's fate in RAF service was similar to that of the Mirage IV. In 1967 sterling was devalued against the backdrop of a UK trade deficit and a weak domestic economy. To exacerbate matters, the UK government was forced to borrow from the International Monetary Fund and other central banks, which reduced reserves of UK foreign currency and gold. The value of the pound was cut from \$2.80 to \$2.40; a reduction of 14 per cent. Straight off the bat this meant that the UK would have to pay at least 14 per cent more for the F-111Ks, meaning that the type would now have a unit price of £3m.

The bad news for the F-111K kept coming. In 1968 Wilson announced the decision to withdraw

British forces from permanent bases east of the Suez Canal. This was a body-blow for the F-111K, as government plans had called for two of the four proposed F-111K squadrons to be based "east of Suez". This decision sounded the death-knell for the F-111K, and the programme was cancelled.

The cancellation paved the way for the RAF's acquisition of the Buccaneer, and ultimately for the UK's involvement in the pan-European Multi-Role Combat Aircraft (MRCA) initiative with Germany and Italy, which to some degree was an outgrowth of the AFVG project (abandoned by France in 1967), resulting in the highly successful Panavia Tornado series of combat aircraft.

So, having spurned a European solution for the TSR.2's replacement in the French Mirage IV, the UK was now to collaborate with (albeit different) continental partners to acquire a ground-attack aircraft. Yet the demise of the F-111K and the abortive bid to develop an anglicised Mirage IV heralded the end of the RAF's attempts to acquire an aircraft purely configured as a bomber. The Mirage IV needed too much work and money expended on it to meet RAF needs, and so did the F-111K. Both fell victim to politics and economics — arguably the two most important factors in military aircraft procurement.



**ACKNOWLEDGMENTS** The Editor would like to thank Tony Buttler, Jean-Christophe Carbonel and Chris Gibson (Blue Envoy Press) for their invaluable assistance with the preparation of this feature

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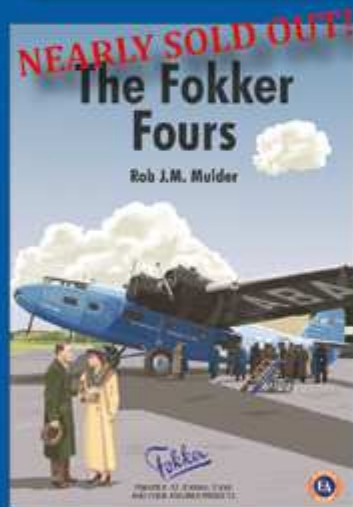


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# THE LONG ROAD ★ TO KABUL

## THE SOVIET UNION & AVIATION IN AFGHANISTAN, 1921–30

For most of us, the predominant mental image conjured by the phrase “Soviet aviation in Afghanistan” is probably grainy 1980s film footage of a red-starred helicopter gunship unleashing a salvo of rockets into a remote Mujahideen hideout — but the Soviet Union’s aviation activities in Afghanistan date back almost a century, reveals **VLADIMIR KOTELNIKOV**



**T**HIS ARTICLE IS not about the participation of Soviet aircraft in combat operations in Afghanistan in the 1980s, about which much has already been written. Here we tell the story of events that happened some 60 years previously, when Afghanistan was going through one of the most turbulent times in its history. Located in the rugged mountains between India and Central Asia, Afghanistan was historically of strategic and tactical interest to the British, who saw the country as a valuable colonial asset of the sprawling British Empire, and who had occupied Afghanistan during 1839–42 and later established a protectorate over the country from 1879 to 1919.

To make matters more complicated, the Afghans were not a united people, but rather a collection of tribes, subservient to their chiefs, who would by no means always support the sovereign ruler — the Emir. In February 1919 Emir Habibullah Khān, who had ruled since 1901, was assassinated in a coup, and Prince Amānullāh Khān took power. The latter, by local standards, was a progressive leader, abolishing slavery, introducing a series of relatively democratic reforms and declaring a constitutional monarchy. For the leadership of Soviet Russia, however, his anti-British position was of rather more interest.

### EARLY AIR POWER IN AFGHANISTAN

By April 1919 the Russian Soviet Federative Socialist Republic (RSFSR — the predecessor of the Union of Socialist Soviet Republics during 1917–22) had established diplomatic relations with Afghanistan and recognised its borders. Great Britain, however, refused to recognise Afghanistan's independence and on May 3 the Third Anglo-Afghan War began when poorly equipped Afghan troops crossed the frontier at the western end of the Khyber Pass with a view to invading British India. In the ensuing conflict, British forces were supported by aircraft, which undertook bombing sorties on Kabul and concentrations of Afghan troops. The fighting culminated in the signing of an armistice in June 1919 and was officially concluded with the signing of the Treaty of Rawalpindi on August 8 that year, in which Britain finally recognised Afghanistan's independence.

The same month the Ambassador of the Republic of Turkestan in Central Asia arrived in Kabul. At this time, Soviet Russia was cut

**OPPOSITE PAGE, TOP** A Polikarpov R-1 (licence-built D.H.9A) of the Afghan Air Force in June 1925, bearing the flag of Prince Amānullāh Khān's Emirate. **Artwork by ANDREY YURGENSON © 2020. OPPOSITE PAGE, BOTTOM** One of the Afghan Air Force's R-1s at Kabul in the mid-1920s. The inscription beneath the port lower wing reads "Allahu Akbar" ("God is Great").

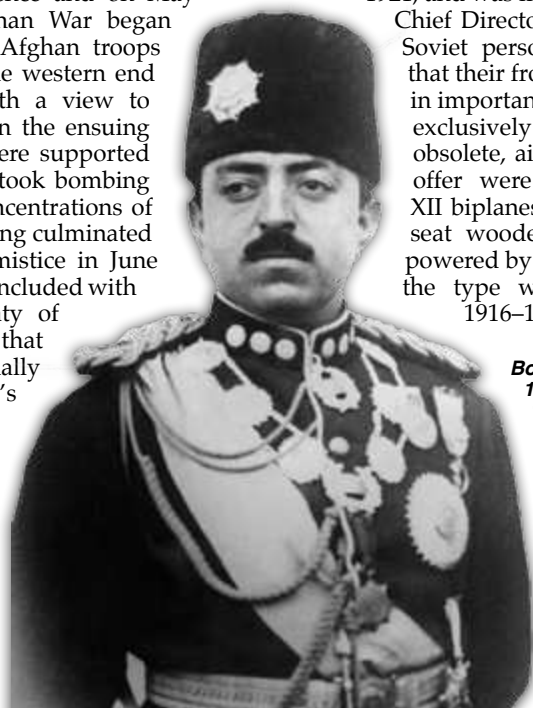
ALL IMAGES VIA AUTHOR

off from the Afghan border by the various front lines in the ongoing Russian Civil War between the Red (Soviet) and White (Tsarist) Armies. The Afghans expressed their interest in acquiring a range of weapons, including aircraft. On August 18 a telegram was sent from Tashkent in Turkestan (now Uzbekistan) to Moscow stating that the Afghan Consul was requesting three aircraft. In October an Afghan delegation reached Moscow, and in December RSFSR Ambassador Plenipotentiary Ya.Z. Surits arrived in Kabul.

In February 1921, following a British attempt to assassinate Amānullāh Khān the previous year, a non-aggression pact between the High State of Afghanistan (as it was officially known) and the RSFSR was formalised. Attached to this treaty was an additional agreement dated February 28, 1921, which provided for military assistance to the Afghans, for which the Soviets were obliged to supply 12 aircraft, two four-gun anti-aircraft-artillery batteries, 5,000 rifles with cartridges and equipment for a gunpowder factory, as well as establish a flying school in Kabul. Furthermore, all this had to be done within two months.

### AFGHANISTAN'S FIRST AIRCRAFT

Problems arose with the aircraft order immediately, the latter not being issued to the commanders of the Turkestan Front until June 1921, and was made "over the head" of the Chief Directorate of the Air Force. The Soviet personnel in Turkestan stated that their front was considered inferior in importance to others, and equipped exclusively with "third-category", i.e. obsolete, aircraft. The best they could offer were eight serviceable Lebed XII biplanes then in Tashkent. A two-seat wooden reconnaissance biplane powered by a 150 h.p. Salmson engine, the type was manufactured during 1916–19 at the V.A. Lebedev



**Born near Kabul on June 1, 1892, Prince Amānullāh Khān was the third son of Emir Habibullah Khān. Upon the latter's assassination in February 1919 he assumed power as Sovereign Prince of Afghanistan, as which he ruled until 1926; and as "Master King" until forced into exile in Europe in 1929.**



**LEFT** *Possibly of Latvian descent, V.V. Goppe was appointed to lead the RSFSR special-purpose section established to provide aircraft and personnel for Afghanistan in 1921. He would be involved in Soviet aviation in Afghanistan for the next ten years, being a regular participant in ferry flights, displays and logistics for the fledgling Afghan Air Force.*

factory in Petrograd (St Petersburg). On August 6, 1921, an order arrived from Moscow — the Lebeds in Tashkent were not to be touched.

The search for replacements began. Three machines were found, all different types, comprising a single Nieuport 24 fighter (a dozen of which, fitted with 120 h.p. Le Rhône Jb rotary engines, were acquired in France in 1917 by the Russian Provisional Government) and two reconnaissance aircraft — a Sopwith 1½-Strutter and a Farman XXX fitted with a Salmson engine. The latter, which had been manufactured at Moscow's Dux factory, was also known as the "Fartri" or "Farsal". These three were handed over to a newly formed special-purpose aircraft section under the command of V.V. Goppe, incorporating 25 staff including pilots, mechanics, engine specialists, carpenters, machinists and servicing personnel. Goppe made a preliminary visit to Afghanistan to inspect the prospective site for an airfield on the outskirts of Kabul. On July 24, 1921, the People's Commissariat for Foreign Affairs had informed the Afghans that "all the military hardware that has been promised will be handed over to the government of Afghanistan without charge".

The three aircraft were delivered by rail to Termez on the Turkestan/Afghan border, where they were assembled and test-flown. During the course of a test flight on September 4, 1921, control of the Farman was lost and it crashed into the Amu Darya river. The bodies of pilot Schultz and observer Valchak were never retrieved.

The two remaining aircraft were again partly dismantled and on September 21 the column

departed Termez and crossed the border bridge. The aircraft were towed on their own wheels using a rope attached to their undercarriages. Braces were attached to the removed fins of the aircraft and carried by camels. The 1½-Strutter's wings were packed into a special container and carried on two arabas (carts) linked together. Two more arabas carried the engines in containers. Barrels containing fuel and oil were carried on camels. Propellers and various other items were tied to infantry members' backs or carried on camels. The personnel rode on horseback, the Afghan government supplying all the animals necessary for this journey.

### A TRANSPORT MENAGERIE

The column reached Mazar-i-Sharif in northern Afghanistan on September 23, 1921. There the Afghans constructed two more large arabas; one for the fuselage of the 1½-Strutter and a second for its wings and a spare set of wings for the Nieuport. The arabas were designed for rapid dismantling, as they could not be carried across local bridges, via which everything had to be carried by hand. The engines were removed from their containers before being dismantled into component parts and packed into leather coffrets (cases) to be carried by the Afghans on horseback; one horse could carry four of these coffrets.

It quickly became clear that carrying fuel on camels over uneven ground was problematic. The fluid would spill out, pouring on to the animals' flanks. To remedy this, the barrels were placed on stretchers, which would be hauled by two horses, harnessed front and rear. Castor oil was poured into cans. Three elephants, sent by the Emir from Kabul, were used to carry large containers.

On October 10 the convoy departed Mazar-i-Sharif, accompanied by numerous guards and officials, who roped in the local peasantry to prepare the road ahead, and reached the mountains four days later. The road became narrower and steeper; in places the arabas were carried by hand, in others they had to be dismantled and their contents loaded on to the elephants. The airframes, along with the wings, were carried on the shoulders of up to 12 people. Attempts were made to prepare donkeys to transport them, harnessed at the corners, but training four donkeys to walk at the same pace proved impossible. As a result, some of the cargo was lost on the way; animals broke free and their loads became scattered. The Emir received regular reports on progress from his runners.





**ABOVE** A poor-quality but extremely rare photograph of the first batch of aircraft supplied to Afghanistan, comprising a Nieuport 24 and a Sopwith 1½-Strutter, being transported through a characteristically primitive mountain pass by elephant during September–November 1921. The arduous journey through the Hindu Kush took some seven weeks.

By October 21 the column had traversed two vast mountain passes. The steep descent began. The 1½-Strutter was initially pointed nose-first, and then turned tail-first. Afghan workers moved large stones on the road out of the way, and in places the road had to be made wider, up to 50 people being drafted for this work.

The situation did, however, improve for a short time. The column eventually encountered a relatively good road, which had been built on the orders of the Emir, and which was already finished in some places. On October 24 the column reached the Dendai-Shivan pass. Ahead lay a narrow path with steps built into it, requiring the column to stop every 10min. Two more smaller and easier mountain passes were also traversed, and by October 27 the column had reached Bashilai. A relatively good road led away from that point. On November 8 the convoy stopped at a location not far from Kabul. The Emir wanted the aircraft to be assembled there so that they could be pulled to the capital by the elephants, but had to be dissuaded from this idea.

## INTO KABUL

After this spectacularly arduous journey, the column finally reached Kabul in marching formation a few days later. One of the Emir's palaces was made available for the personnel, along with the standard complement of servants. By this time the Afghans had completed the airfield, but, with only a vague idea of how much space a flying-machine would need, had made it too small. Furthermore, it was surrounded by a deep ditch. Everything had to be reworked.

Afghan officials thus transported huge numbers of people, horses and oxen to the airfield, and even obtained a tractor. Hangars and a workshop were built on the edge of the airfield and it was in the latter that the two aircraft began to be assembled and repaired. Unsurprisingly, they had suffered substantial damage over the course of the journey.

By this point some semblance of a flying school had been established in Kabul. The chief instructor, E.M. Gorodetskiy, was a former officer in the White Army, and had already begun to teach two Afghan pilots. Following the arrival of the special-purpose detachment, instruction gathered pace and began to incorporate technical and practical theory, led by I.G. Chuchin. Three officers were also despatched to Italy by the Emir to study airmanship.

The Emir's modernising ways were not universally popular in Afghanistan, however, and unrest broke out once again around this time. Perhaps unsurprisingly, the Soviet pilots elected to leave Kabul as soon as possible and abandoned the aircraft, along with all the attendant equipment, without having completed a single flight. The Emir held on to power, although further unrest broke out in early 1922. On May 6 that year a decree was issued regarding the formation of a



**ABOVE** Chief of the Air Forces of the Turkestan Front P.Kh. Mezheraup scrutinises a map in preparation for one of his long-distance flights in the mid-1920s. Mezheraup led the six-aircraft formation ferry flight of D.H.9/9As from Termez to Kabul in 1924, and delivered an R-1 1,200 miles (1,900km) from Moscow to Ankara in Turkey in 1926.

"Secret Air Wing". Well-known Russian pilot and flying instructor A.A. Porokhovshchikov was appointed commander of the unit, its personnel numbering 26 in total, including pilots A.S. Demchenko, A. Petrov, A.E. Rossov, S. Surovnikov, V. Yatsenko and the aforementioned V.V. Goppe, plus two air observers — V. Blinov and N. Sysoyev — and navigator M. Zasulin. There were also two technicians; a lathe operator; propeller specialist; welder; radio-telegrapher; clerk and a quartermaster. However, this course of action was decided against and the "Secret Air Wing" never set off for Afghanistan.

### THE NEXT ATTEMPT

Little more happened in Afghanistan in aviation terms over the next two years. In 1924, however, the Emir expressed a wish to receive a batch of aircraft, along with the airmen and technical staff necessary for their operation. Moreover, these personnel would become part of the Afghan armed forces and were to participate in combat activity against opposition forces; by this time anti-Amānullāh Khān insurgents were some 50 miles (80km) from Kabul. Protracted negotiations with the Soviet Union (as the RSFSR had become in 1922) followed.

The main stumbling block was money. The Afghan government procured the aircraft, about which more shortly, and the financial issue was duly "brought under control". Nevertheless, negotiations became bogged down on another issue, namely the stipulation that the Soviet pilots, flight observers, mechanics, and engine specialists were to be paid their monthly wages by the Afghan government, and that this would be paid partly in the local currency and partly in

sterling. In the event that a pilot was injured or killed, compensation would also be paid by the Afghan government. The problem was that the Soviet Air Force Directorate (UVVS) constantly tried to force a better deal. The latter was not motivated by altruism towards the personnel posted to Afghanistan, since they would be paid a small fraction of the money, with only slightly more being paid to their families remaining in the USSR. The majority of the currency earned by those deployed to Afghanistan would be paid directly into the Directorate's non-budgetary fund, from which purchases not included in the state plan were made, including overseas business trips for the management.

Ultimately, letters were sent from the People's Commissariat for Foreign Affairs to the UVVS persuading its management to temper its greed. Significantly, the Germans and Italians had arrived on the scene and were offering their services far more cheaply. Under threat of being "left out in the cold", the UVVS agreed to reduce its demands and the deal was duly signed.

The intention was to supply six aircraft to Afghanistan, usually described as R-1 biplanes, a Soviet modification of the British Aircroft (de Havilland) D.H.9A two-seat reconnaissance aircraft and light bomber. By this time, production of the R-1 was already up and running, but this variant was not yet considered combat-capable as production of the indigenous bomb-racks, bomb-release mechanisms and gun mounts had only just begun. It is unlikely that the Emir agreed to accept aircraft which were not yet suitable for battle operations. It is more likely that he was resold D.H.9As which had been expatriated out of the UK in 1923 in the form of kits of components and

assembled at Soviet factories, using American Liberty engines. [See the author's "We Have Our Very Own Soviet Engine" in TAH11 — Ed.] The fact that contemporary documents refer only to de Havilland tends to support this theory. In photographs it is almost impossible to distinguish an R-1 from a D.H.9A. One photograph, however, taken in Kabul in the autumn of 1924 (**BELOW RIGHT**) shows an example apparently fitted with a Siddeley-Deasy Puma engine. At that time in the Soviet Union the Puma-engined R-1SP (aka R-2) was yet to enter production, but D.H.9s (aka DH.9SPs) were being imported from the UK, and a batch had recently been despatched to Turkestan. The Soviet R-1SP's wheels were slightly smaller and the British Puma-engined aircraft had a shorter span, but it is impossible to discern either from the photograph. Therefore it may be safe to conclude that the Afghans were sent five D.H.9As and one Puma-engined D.H.9.

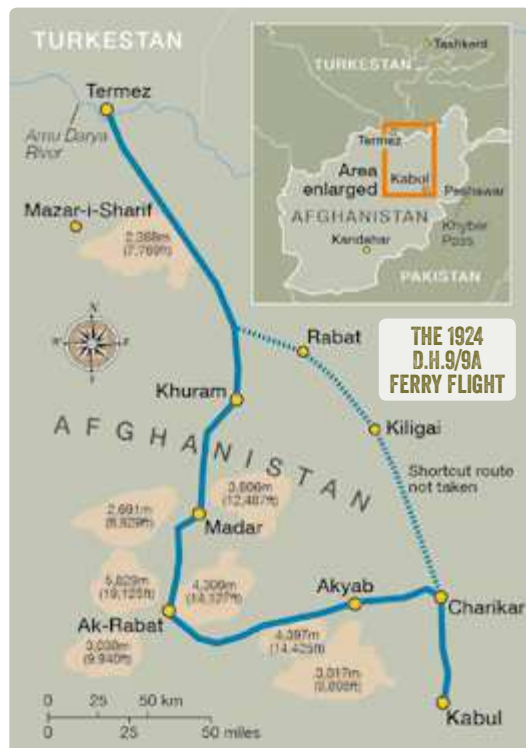
This time the decision was made to ferry the aircraft by air. The road on which the aircraft had been transported in 1921 had by this time been cut off by the insurgents, and all other roads were little more than caravan tracks and not suitable for moving large loads. Three possible ferry routes were examined, all taking the aircraft over treacherous mountainous areas.

The *Nachvozdukhtrik* (Chief of the Air Forces of the Turkestan Front), P.Kh. Mezheraup, was appointed leader of the flight. He was to fly one of the aircraft, and another five pilots were also selected, mainly from those who had previously served in Central Asia and who were familiar with the specifics of the region. These were Yu.I. Arbatov; M.M. Garanin; V.V. Goppe; A.I. Zalevskiy and Ya.Ya. Yakobson. The following personnel were also selected as crew members: flight observer I.V. Sychennikov; mechanics P.A. Lisitskiy and M. Staroskoltsev, and engine specialists V.A. Voyenskiy, and P.P. Sinyavskiy.

### THROUGH THE MOUNTAIN PASSES

The aircraft for the ferry flight were assembled and test-flown in Tashkent. Additional fuel tanks were fitted to the aircraft, extending their range to 500 miles (800km). The group of six D.H.9/9As took off from Tashkent on September 29, 1924, and by the end of the day had reached Termez, where all landed safely.

The next morning the pilots were due to fly over the Afghan border, but were delayed owing to one aircraft's engine failure. Having finally set off, the six flew over sandy regions before the terrain became increasingly mountainous. The type's service ceiling was less than 13,000ft (4,000m), forcing the group to weave through the gorges and cross mountain ridges by navigating



MAP BY MAGGIE NELSON



through the passes. The group resisted the temptation to take a short cut via Rabat and Kiligai (in Baghlan Province) as by doing so would mean encountering mountains up to 21,000ft (6,400m). Instead, a route was selected with the first stages via Khuram, Madar and Ak-Rabat. The onward route via Tashqurgan (now Khulm) and Charikar was the most treacherous part of the journey. The lack of oxygen at altitude caused lethargy among the pilots and gave them headaches. An emergency landing in the rugged mountains of this region would almost certainly be fatal, and landings could only be made on the primitive airfields at Haibak and Charikar, where specially despatched personnel and fuel awaited them should it be necessary. The latter, however, were not required. After having traversed the 14,127ft





**LEFT** Soviet pilot V.F. Kaminskiy led the flight of six R-1s from Termez to Kabul in July 1925, although only four actually completed the hazardous journey, two having to make forced landings before being returned to Tashkent. Life for the Soviet pilots in Afghanistan was hard, with primitive conditions, relatively low pay and the mountainous terrain creating unpredictable and frequently dangerous flying conditions.

(4,306m)-high peak of Ak-Rabat, the detachment began to turn eastwards and reached Charikar, 35 miles (55km) from Kabul. The 280-mile (450km) flight from Termez to the Afghan capital took 3hr 45min flying time.

At Kabul airfield a welcoming party awaited the Soviet pilots, including the Soviet Ambassador Plenipotentiary, L.N. Stark, and Commander of the Afghan Air Force Ehsah Khān, among other dignitaries. The following day, at the request of the Emir, demonstration flights were performed over Kabul, during which flowers and leaflets were dropped.

Mezheraup returned to the Soviet Union, but the other participants in the ferry flight were enlisted as officers into the Afghan Army, thereafter wearing the corresponding uniform. Goppe was again appointed CO of the Soviet Wing. He and Mezheraup were awarded the Order of the Sun, 4th Class, by the Afghans, while their fellow crew members were also awarded medals. The latter (except mechanic Staroskoltsev) were also awarded the Order of the Red Banner on their ultimate return to the Soviet Union.

The British voiced their strong opposition to the arrival of Soviet aircraft and pilots in Afghanistan, but this was roundly ignored.

## INTO ACTION

On October 5 (other sources claim October 6), 1924, two of the D.H.9As completed the first Afghan combat sortie, against tribes participating in the 1924–25 Khost Rebellion in Afghanistan's Southern Province, dropping bombs and leaflets in the area around Zurmakh. Another three sorties were later flown in the Khost and Chardan areas, in which reconnaissance was undertaken

and concentrations of enemy troops were strafed with machine-gun fire. Stark reported to Moscow that the flights "had an enormous political impact", and that all the ammunition supplied with the aircraft had been expended. The crews had to wait for a horse-drawn caravan to bring ammunition from Central Asia.

The effectiveness of this use of air power turned out to be significant. The majority of Afghans had never seen an aircraft before; the roaring engines spread panic among tribesmen, and even more so among the horses and camels. The insurgents obviously had nothing in terms of anti-aircraft defence; a machine-gun was a rarity and few even had rifles. Therefore it was extremely unusual for the aircraft to experience any groundfire during a combat sortie.

By this time Emir Amānullāh Khān had announced ambitious plans to form his own air force, with two reconnaissance detachments and one fighter detachment, 12 aircraft in each — 36 aircraft in all — along with a flying school. The Emir also wanted to establish an international airline flying on the routes Tashkent—Kabul, and Kushka—Herat—Kabul.

On March 26, 1925, the Soviet Union's Politburo made the decision to transfer another six aircraft to Afghanistan, along with the necessary aircrew and servicing personnel. This time they were definitely R-1s, manufactured under a special export order at *Zavod* (factory) No 1 in Moscow. The aircraft took off from Termez on July 4, 1925, led by V.F. Kaminskiy and travelled over a shorter route than that taken by the previous six, which Mezheraup had rejected. However, only four of the six biplanes reached Kabul. One was flown by Kaminskiy, the others by P.M. Safronov, V.M. Zharnovskiy and G.M. Bondaryuk. Mechanics S.I. Yeskov, I.I. Zagorodko, I.A. Martynenko and A.I. Fomin were carried in the rear seats. The pilots were later awarded the Order of the Red Banner. The remaining two had to make emergency landings on Afghan territory; one landed on sand soon after take-off from Termez while the other made a forced landing in the mountains. Both were successfully repaired, however, Bondaryuk flying them back to Tashkent. Neither was returned to the Afghans, new examples being sent instead, which were delivered to Kabul in October 1925.

The first batch of four R-1s was handed over to the Afghans in a grandiose ceremony on July 31, 1925, with large crowds and an orchestra in



attendance. The Emir plus the Minister for War, Sardar Shah Wali Khān, Ehsah Khān (who was not qualified to fly) and Soviet Ambassador Stark were all present. The new R-1s were lined up on the airfield along with the aircraft that had arrived previously and the Emir was presented with a model aircraft on behalf of the Soviet pilots.

### THE EMIR TAKES TO THE AIR

Seven aircraft took part in a demonstration flight in the hands of pilots Arvatov, Goppe, Zharkovskiy, Zalevskiy, Kaminskiy, Safronov and Yakobson, after which air-experience flights were offered, with Amānullāh Khān being the first. Reportedly, the Emir was not only very interested in the aircraft, but in all the details concerning the flight. There was no shortage of willing volunteers to fly, and some of the aircraft made up to 15 sorties. Among the passengers were Afghan ministers, Soviet embassy staff and even local women. Zalevskiy performed a number of loops with Ehsah Khān in the rear seat, to the latter's evident enormous delight.

September 2, 1925, saw the official opening of the flying school in Kabul, to which one aircraft was allocated and 15 students enrolled, ranging from 18 to 23 years of age, selected from the higher military colleges or front-line units. Wali Khān and Ehsah Khān both attended the opening ceremony. Lectures were given in Russian via an interpreter, but at the same time the Afghans were taught Russian. After completing ground-school studies the students were sent out to the airfield for daily practice. Groups of ten Afghans were also sent to the USSR to study.

As well as the R-1s, the Soviet Union also sent a sole Junkers F 13 in October 1924. This

**ABOVE A group of Soviet pilots pose with the Commander of the Afghan Air Force Ehsah Khān (fifth from left) beside an R-1 at the airfield at Sherpur, near Kabul, in the mid-1920s. The R-1 is widely regarded to be Soviet Russia's first mass-produced aircraft, with more than 2,400 examples built at the Dux factory in Moscow during 1922–32.**

four-passenger plus two-crew monoplane had been acquired for the Soviets in Germany, and examples had also been assembled at a Junkers subsidiary factory at Fili, Moscow. The Afghan aircraft (c/n 666, at some point named *Abdul Ghafur* according to Junkers historian Lennart Andersson) had been allocated from a batch of four that belonged to Soviet Air Force units in the Central Asian Military District (SAVO), and was apparently the subject of "double accounting"; the Afghans considered the aircraft theirs, but the SAVO administration still listed the aircraft as being in its own fleet, referring to it as "another aircraft in Kabul".

In September 1926 Afghan Air Force pilot Yu.N. Arvatov and mechanic Lisitskiy made a Kabul—Termez—Tashkent flight in the F 13, covering 745 miles (1,200km) in 9hr 5min with one passenger — Ambassador Stark — aboard. The following year Stark returned to Kabul, flying to the Afghan capital with pilot M.S. Semyonov and mechanic V.I. Sobetskiy of Soviet air transport organisation Dobrolyot in an F 13 on September 14, 1927, via Termez. Stark returned to Tashkent via a direct flight five days later.

In the autumn of 1927 Dobrolyot received a government commission to establish an international commercial service between Tashkent and Kabul. With this in mind F 13 R-RDAZ *Pishchevik* (food industry worker) was assigned



**ABOVE** Junkers F 13 (reportedly also referred to by the Soviets as a “Ju 13”) R-RDAZ during its transport by train to Central Asia circa 1924. Note the legend “Dobrolyot” (the Soviet air transport organisation) on the engine cowling, below which is the aircraft’s name “Samolyot Pishchevik” — literally “Aeroplane Food Industry Worker”.

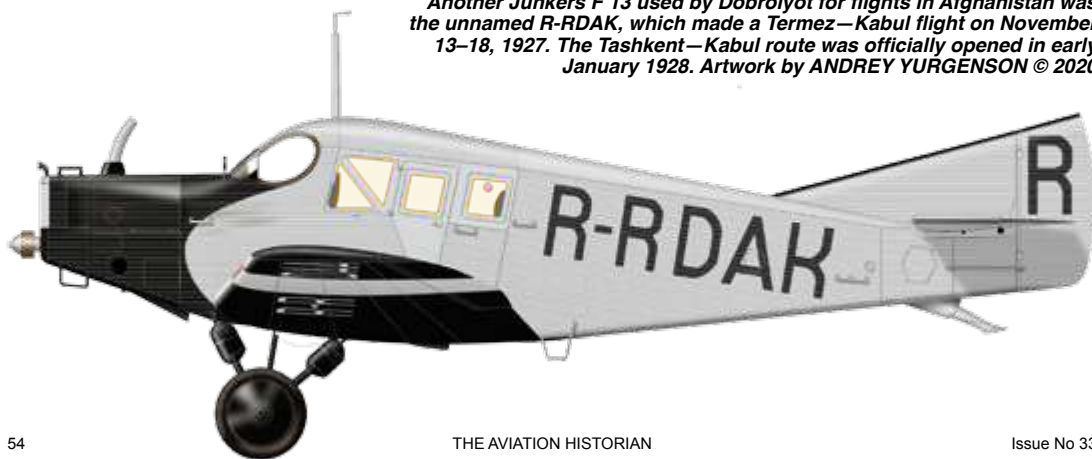
to this task by Dobrolyot’s Central Asian branch in Tashkent. Comprising pilot M.T. Slepnev and mechanic V.I. Sobetskiy, a crew was allocated to test the aircraft’s high-altitude capabilities on a flight from Tashkent to Dyushambe (now Dushanbe in Tajikistan), which included flying over a 13,780ft (4,200m) mountain pass. On board, aside from the crew, were two passengers and 40kg (88lb) of baggage. The following day the F 13 returned to Tashkent with three passengers.

In December *Pishchevik* flew to Termez, from where it continued on to Kabul after an overnight stop. On board was a single passenger, the Soviet military attaché. On approach to Kabul, a group of Afghan aircraft appeared, forming a guard of honour. After the aircraft had landed a welcoming committee was arranged, including the Emir’s brother.

Initially, flights to Kabul were sporadic, before the adoption of a programme of two flights a month. By the beginning of 1928 a dozen flights had already been completed, with Stark having made the flight several times, and it was via this same route that the Afghan Ambassador Mohammed Khān also flew to Moscow. The tickets were very expensive; to fly from Kabul to Termez cost 150 roubles, and onwards to Tashkent was 250 roubles. Despite such a high price, the Tashkent—Kabul route turned out to be a profitable one, the subsidies from the Soviet government amounting to around a third of the income derived from the route. Pilots N.I. Baranov, V.G. Levchenko, M.S. Semyonov, M.T. Slepnev and E.I. Shvartz worked on this route at various times.

The group of Soviet aviators in Afghanistan did

**Another Junkers F 13 used by Dobrolyot for flights in Afghanistan was the unnamed R-RDAK, which made a Termez—Kabul flight on November 13–18, 1927. The Tashkent—Kabul route was officially opened in early January 1928. Artwork by ANDREY YURGENSON © 2020**







**ABOVE** Soviet air- and groundcrew beside an Afghan Air Force R-1, two members of the group holding general-purpose bombs. The effect on tribesmen in the more remote areas of Afghanistan of such new weapons delivered by means of air power was profound, and gave the Emir a clear advantage in projecting almost God-like power.

not remain constant, pilots and crew members returning to their homeland for various reasons, but replacements were despatched. Apart from the Soviet personnel in Afghanistan, a sole pilot hired in Germany also plied his trade there, as did an Afghan pilot who had completed his flying training in Italy.

### ARMING AFGHANISTAN

At the end of 1927 Amānullāh Khān, who had recently proclaimed himself *Padishah* (Master King), set off for Europe with his entourage, where he ordered a large consignment of weapons and military hardware including rifles, machine-guns, artillery, armoured cars and aircraft. Mail was delivered to the Afghan ruler via the Kabul—Tashkent service. The Padishah returned via Moscow, where he spent a fortnight.

In the spring of 1928 he visited the Central Airfield in Moscow, then home to the NII-VVS (Soviet Air Force Scientific Testing Institute). The Padishah and his fellow guests were escorted by K.E. Voroshilov, the People's Commissar for War & Naval Affairs, his deputy S.M. Budyonniy and the Head of the Air Force Directorate P.I. Baranov. The Afghans were treated to a demonstration of R-1 and R-3 reconnaissance aircraft, as well as the Tupolev I-4 and Fokker D.XI sesquiplane fighters. The Emir was given a flight, not in a Soviet aircraft, but in a Dutch Fokker C.VD reconnaissance aircraft acquired for study purposes. Elaborate efforts were made to persuade the Afghan delegation to procure I-4s and R-3s, despite both types being largely unsuccessful and relatively

expensive. The Padishah, wisely, turned all such offers down.

In January 1928 nine Afghan pilots and mechanics trained in the USSR returned to their homeland. A further three or four joined them shortly thereafter. During May–June the same year a further 15 R-1s were sent to Afghanistan, again ferried by air. The transfer of this batch was subject to a number of unfortunate events. Two aircraft caught fire on the airfield in Tashkent, and one crashed on take-off at the same location. Despite the organisation of an escort, with Dobrolyot aircraft taking the lead, quite a few of the aircraft got lost and had to make emergency landings. To add to these troubles, four R-1s were subject to technical failures. Another aircraft, which had strayed off course, landed in India. By the end of 1928 the Afghans had 20 aircraft (of which 11 were serviceable) and approximately 30 personnel, ten of whom were locals.

While the Padishah went off on his international travels, his enemies gathered their forces in late 1928. Pashtun tribes staged an uprising in Jalalabad in the eastern part of the country and the Tadjiks rose up in the north. Air power was used to support the response by the Army, loyal to the government, in which Soviet pilots played a part. In mid-December detachments loyal to the Saqqawist leader Habibullāh Kalakāni laid siege to the capital, as a result of which the British in India organised an air bridge, eight aircraft airlifting some 600 foreigners from Kabul to India.

Afghan government aircraft undertook aerial reconnaissance and on December 14 an R-1 hit a



**LEFT** Soviet mechanics Martynenko and Matsunov beside an R-1 in Kabul. The standard production R-1 was powered by a 400 h.p. M-5 liquid-cooled V12 piston engine, essentially a classic bit of Soviet reverse-engineering, resulting in a metric version of the USA's ubiquitous Liberty engine. For more on the history of the M-5 see the author's article in TAH11.

tree and caught fire while flying at low altitude. From December 17 aircraft began to bomb enemy forces, the latter retreating a week later. On January 15, 1929, however, Hābibullāh Kalakāni took Kabul and proclaimed himself Padishah. On his return to Afghanistan Amānullāh Khān abdicated and fled to British India, before returning to Kandahar.

### THE LAST REDOUBT

By March 1929 all Soviet aviation personnel had been evacuated from Afghanistan, with the aircraft left behind to be used against the former Padishah's forces. They were flown by Afghan pilots and were serviced by locals who had been trained in Kabul. The operation of the Tashkent—Kabul service was stopped.

Refusing to be beaten, however, Amānullāh Khān made an appeal for military assistance

from the Soviet Union, where a decision was made to support him, although attempts to do so were kept quiet. At the beginning of May 1929 a Soviet "foreign-legion" military unit, formed of personnel born in Central Asia, crossed the border. Commanded by V.M. Primakov, the unit was joined by detachments loyal to Amānullāh Khān which had been driven away to the north. SAVO aircraft supported the advance of these troops to the south, and on May 6 several aerial sorties were launched on enemy positions. Two days later SAVO aircraft bombed the fortress of Daidei, which led to its capture, and on May 25 Soviet pilots participated in an attack on Tashqurgan. The latter operation was performed in total secrecy, so hard information is somewhat scarce, but on the basis of circumstantial evidence it seems that it involved a single flight of five obsolescent Fili-built Junkers T 21 parasol-wing reconnaissance aircraft (aka "Ju 21s") from the 35th Air Detachment, which had been redeployed from Tashkent to Termez.

All these efforts came to nothing, however, and at the end of May Amānullāh Khān called off the offensive and fled once again to British India, surfacing a short time later in Italy. On May 28 Primakov received orders to halt all operations, and Soviet forces withdrew to the north and back across the border.

By October 1929 Hābibullāh Kalakāni had also been overthrown, and Muhammed Nadir Khān, former Minister of War and Afghan Ambassador to France, came to the throne as Muhammed Nadir Shah. He treated the Soviet government with caution, remembering their recent assistance to Amānullāh Khān. Nevertheless, "realpolitik"



**In late May 1929 five Soviet-built Junkers T 21s (aka "Ju 21s") of the Soviet Air Force's Termez-based 35th Air Detachment of the 454th Air Brigade may have taken part in a secret mission against insurgents in Tashqurgan, bearing no markings of any kind, as seen here. The T 21 was a two-seat reconnaissance parasol-wing monoplane, with a flexible gun-mounting fitted to the rear cockpit. Artwork by ANDREY YURGENSON © 2020**



**ABOVE** During September–October 1930 a flight of three Polikarpov R-5 biplanes made a long-distance flight from Moscow to Afghanistan via Crimea, Turkey and Iran, with a view to promoting sales of the first of the Soviet Union's original aircraft designs to be built in numbers. After a delayed arrival in Kabul, the three R-5s returned to Moscow.

intervened and diplomatic relations between the Soviet Union and Afghanistan were restored.

In September 1930 Kabul was visited by a detachment of three specially built unarmed Polikarpov R-5 biplanes on a long-range flight linking Moscow, Kacha in Crimea, Ankara in Turkey, Tiflis (now Tbilisi in Georgia), Tehran in Iran, Termez and Kabul before heading back to Moscow via Orenburg. The group was led by F.A. Ingaunis, Head of the Air Forces of the Ukrainian Military District, the two other aircraft being piloted by F.S. Shirokiy, and Ya.A. Shestel. Navigator I.T. Spirin from the NII-VVS also participated in the flight, as did engineer A.I. Mezinov and well-known journalist M.E. Koltsov.

The three aircraft departed Moscow on September 4, 1930, and reached Kacha safely, but had to make two attempts to get to Ankara. They were further delayed in Turkey by having to perform demonstration flights and air-experience flights for high-level officials, forcing a late arrival in Tehran. The three landed safely in Termez, but on the Kabul leg were forced to turn back halfway owing to engine failure in one of the aircraft. After a night spent repairing the aircraft, the Soviet pilots landed in the Afghan capital the following day. The R-5s returned to Moscow on October 18, all crewmembers receiving Orders of the Red Star. One of the goals of the flight had been to promote the new Soviet aircraft, and although Iran did actually procure a batch of R-5s and the Turks received a few by way of a gift, no interest was shown in them in Afghanistan.

By the end of 1930 commercial air transport operations on the Tashkent–Kabul route had resumed, but on an irregular basis. Between November and December that year the Junkers

F 13 made a total of 14 flights along the route.

Meanwhile, in March 1930 the Soviet People's Commissar for Foreign Affairs informed the Air Force Directorate that the Afghan government had a remaining debt of 80,450 Afghan Afghanis and £1,800 sterling outstanding in terms of salary payments to aircrew, and injury-compensation commitments amounting to 40,500 Afghanis and £120. The military demanded settlement of these debts immediately, but the Deputy People's Commissar for Foreign Affairs outlined the difficult situation then prevailing in Afghanistan, particularly regarding the USSR's attempts to establish a relationship with the new ruler. Muhammed Nadir Shah was putting all his efforts and funds into building up his Army, which had become his mainstay of support. As a result, any demand for immediate payment of such debts was acknowledged as inopportune, and the question remained unresolved.

### THE END OF THE ROAD?

In 1936 the Afghan Minister for War visited Moscow, where he was introduced to the Soviet Union's state-of-the-art military aircraft, including Tupolev's TB-3RN and SB bombers and the same company's I-14 and Grigorovich's IP-1 fighters, in a bid to convince the Afghans to update their airpower assets, but no orders resulted from it. Soviet aircraft and aviation specialists would certainly appear again in Afghan skies, but not for another four decades.



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DAVID H. STRINGER COLLECTION x 2

# ITALY'S FORGOTTEN AIRLINES

## PART THREE / WAR AND BEYOND: THE RISE AND FALL OF PRIVATE ENTERPRISE

Concluding his three-part series on the development of Italy's airlines, from the early pre-war days to the demise of the independents in the 1950s, **MAURICE WICKSTEAD** traces the evolution of the Italian carriers through the enforced amalgamation of the war years, the post-war rebirth of private enterprise and the ultimate swallowing of everything by Alitalia



**P**OLITICAL observers of the time often commented that Benito Mussolini was somewhat distrustful of Hitler in the immediate pre-war period, to the extent of constructing an 1,851km (1,150-mile) series of fortifications, known as the *Vallo Alpino* (Alpine Wall), across Italy's northern frontier. Nevertheless, having watched events turn towards Germany's favour during 1938–39, Mussolini threw in his lot with Germany and on June 10, 1940, took Italy to war against the Allies.

At the beginning of September that year Italy's airlines were mobilised as part of *Comando Servizi Aerei Speciali* (CSAS) under General Aurelio Liotta, with *Avio Linee Italiane* (ALI), *Ala Littoria SA* (ALSA) and *Linee Aeree Trancontinentali Italiane* (LATI) organised into the *Nucleo Comunicazione* (Communications Group) and their crews transferred to full military status. Even before this, however, on June 5, the South American service had been reduced to one trip per month, and shortly thereafter closed down completely.

### **A SHRINKING NETWORK**

In late 1939, reflecting the worsening situation in Europe, ALSA's network had already begun to shrink, the only remaining foreign destinations being those in Germany, Greece, Spain, the Adriatic and the Mediterranean rim. A temporary timetable issued in March 1940 eliminates Berlin, although Sofia in Bulgaria via Tirana in Albania appears to have been briefly reinstated.

When Italy entered the war, the capacity of ALI and ALSA became largely directed towards military campaigns in the Balkans and Greece. Back in April 1939 ALSA's four examples of the Breda Ba 44 — a much-modified licence-built de Havilland Dragon Rapide — used on domestic Albanian services, had been sequestered by the military for operations surrounding Italy's occupation of the territory. One unusual addition to ALSA's wartime fleet was Douglas DC-3 I-EMOS, which operated the Rome–Tirana service before being exchanged with Germany for various types. Formerly operated by Belgian national airline Sabena as OO-AUH, it had been interned by the Vichy authorities at Oran in Algeria while attempting to reach the Belgian Congo, and was subsequently handed over to the *Regia Aeronautica*.

For a while LATI's entire effort was redirected to providing military support flights to Libya and East Africa, but an impassioned plea by Benito's aviator son, Bruno Mussolini, resulted in the restoration of transoceanic services from June 22, 1940 — although not without handicaps. As well as having to operate on two fronts, LATI lost many of its most experienced crews to the military, and new personnel had to be trained for the long overwater flights, conducted solely by astro-navigation and in complete radio silence. At the same time it was no longer possible to supply overseas and offshore bases regularly by sea. Nevertheless, despite all the difficulties,

***Fiat G.212CP I-ELCE of Avio Linee Italiane (ALI) awaits another flight at Zürich-Kloten in Switzerland. Tragically the trimotor was lost in an accident while serving as part of the newly minted ALI-Flotte Riunite on May 4, 1949, when it crashed on approach to Turin in fog, killing the entire Torino FC football team.***

LUIGINO CALIARO COLLECTION





**ABOVE** Breda Ba 44 I-ORIO joined the Ala Littoria fleet in May 1935 and served on the organisation's Albanian routes before being sequestered by the Regia Aeronautica in the spring of 1939. It operated with the latter as part of the 611<sup>a</sup> Squadriglia Trasporto of the Comando Aeronautica Albania on liaison and light transport duties in Albania.

after eight months of operation LATI was able to declare a profit of 1.4m lire. The first year's results reported 65 flights completed, carrying 41 tons of freight and mail; the 100th flight took place on December 1, 1940. Tragically, Bruno Mussolini lost his life in August 1941, while testing the new four-engined Piaggio P.108B bomber.

## ARGENTINA AND BEYOND

Acclaimed engineer Carlo Pezzani, who had organised Balbo's North Atlantic aerial cruise, took over from Liotta as LATI's new chief and began addressing the deficiencies of its SIAI-Marchetti SM.83 trimotor fleet. He ordered six of the new SM.76 (an SM.75 with Pratt & Whitney engines) with improved payload and performance, but, owing to the exigencies of war, only one example was delivered. Instead, five SM.82 bomber/ transports, augmented by at least seven SM.75s and several Fiat G.12s, were obtained to reinforce the fleet and replace the four SM.83s lost in various mishaps.

Even before LATI was established in September 1939, Italy had sought to widen its airline influence even further and had participated in the formation of *Corporación Sudamericana de Servicios Aéreos* to extend services beyond Argentina and feed its South Atlantic services. With a small fleet of Macchi MC.94 flying-boats, flown initially by Italian crews, the first flight was made in February 1939, connecting Buenos Aires with Asunción, the capital of Paraguay.

Italy's ambition of flying all the way to Buenos Aires (via Porto Alegre in southern Brazil) was finally attained on July 20, 1941, and a bi-weekly service was planned, but it was to be a short-lived achievement. Concerned at hostile activity in its own "backyard", America began putting pressure on Brazil (then neutral) to restrict the Italian operation — with some justification, as LATI's crews had been instructed to report enemy shipping movements back to High Command by wireless. The airline also carried essential minerals, metals and commodities vital to Italy's

**BELOW** In late December 1941, under pressure from the American government, the Brazilian authorities impounded all LATI aircraft still in the country. They included this SIAI-Marchetti SM.75, probably either I-BUEN or I-BLAN, photographed by American serviceman Louis A. Tyler at Recife in northern Brazil, in 1942. VIA LEIF HELLSTRÖM







**ABOVE** American photographer Howard Levy took this photograph of SIAI-Marchetti SM.87 — a floatplane version of the SM.75 — I-INNO/MM488 at Brindisi on Christmas Day, 1943, after the Italian armistice. Note that the “L” in “Littoria” on the fuselage legend has been changed to a “V” to make Ala Vittoria, the latter translating as victory!

war effort and even conducted a questionable 7hr flight along Brazil’s east coast, allegedly looking at American military installations and airfields.

Having initially complied by denying LATI fuel supplies, on December 24, 1941 (with the USA now also at war), Brazil rescinded all operating rights, impounding the five aircraft then in the country, including SM.82 I-BOLI on the last flight from Rome, and interning all Italian personnel. The seized aircraft were reportedly compulsorily purchased by the USA. Attempts had been made to head-off the inevitable with the creation of a Brazilian company to operate the South American sectors and re-forming LATI in neutral Portugal, but these efforts were in vain.

During its relatively short life, LATI made 211 South Atlantic crossings, carrying 434 passengers and 198,688kg (438,000lb) of mail and cargo over a total distance of 2,628,074km (1,633,010 miles). It was a remarkable yet often overlooked achievement, invariably conducted under the most difficult conditions, but the cost was high — by the time of the Italian armistice 19 LATI aircraft had been lost and 32 personnel had perished during both civil and military operations.

## TO THE ORIENT?

Planning for eventual peace, Italy had aspirations of extending its international reach to South America’s west coast, northwards to Los Angeles and even as far as Tokyo in Japan. The Tokyo route assumed paramount importance for strategic and propaganda purposes, and on June 29, 1942, LATI’s *tenente colonnello* Antonio Moscatelli departed Rome in a modified SM.75RT (RT for Rome—Tokyo) bound for Japan, reached after just four days routeing via the USSR and China for political reasons [see The Rome—Tokyo

Express by Ray Flude and Gregory Alegi in TAH24 — Ed.] Another unusual mission for former LATI crews was a late May 1943 nuisance raid on the former Italian air base at Gura in Eritrea, by then in American hands, using two civilian SM.75s modified to carry ten 100kg (220lb) bombs.

By mid-1943 Italy’s airlines were operating on two fronts: maintaining regular services to “friendly” countries and supporting the military with troop-carrying, supply, leaflet-dropping and courier missions, even carrying emissaries to Lisbon in Portugal to negotiate an armistice in the summer of 1943. But it all came to an end with Italy’s capitulation to the Allies in September 1943. As German forces began withdrawing northwards they seized 78 civil transport aircraft from the airlines, seven of which remained in Italian hands, to maintain services from Milan to Monaco, Berlin, Munich and Vienna. Within Allied-occupied territory many crews joined the *Aviazione Cobelligerante Italiana* (Italian Cobelligerent Air Force), primarily operating in the Balkan theatre. A transport unit, 2° Gruppo volo (No 2 Flying Group) of the 3° Stormo Trasporti (No 3 Transport Wing), employed surviving CANT and SIAI-Marchetti machines, flying missions over friendly territory from Lecce, near Brindisi.

Like the rest of Europe, much of Italy’s transport infrastructure and surface communications had been all but obliterated by the preceding years of conflict, and thus it became a priority to regenerate the country’s air services after the war. Starting in August 1945, the Allied authorities permitted limited essential administrative flights by the military between Rome (Centocelle) and major Italian cities. By September 1946, operating only a few war-weary SIAI-Marchetti and Fiat transport machines — supplemented by a



**ABOVE** Having arrived in Italy with the USAAF's 47th Troop Carrier Squadron, with which it participated in Operation Husky, the Allied invasion of Sicily, C-47 c/n 9101 was acquired by Linee Aeree Italiane (LAI) in late November 1947 and given the Italian civil registration I-LINC. Sadly, it crashed near Trento in December 1956.



**ABOVE** One of six C-47s operated by Transadriatica, I-TRES (c/n 25573) joined the fleet in February 1947. It later joined ALI in September 1949 and LAI (as I-LILI) in 1952. It served in Italy for another four years before becoming G-AOUD with Transair in the UK in 1956. **BELOW** Fitted with Pratt & Whitney R-1830-S1C3G Twin Wasp engines, Fiat G.12LP I-SASS (c/n 100) was one of four operated by Airone, the others being the Alfa Romeo-powered I-AIRE, 'IRN and 'IRO. All four would ultimately be absorbed into the ALI-Flotte Riunite fleet on amalgamation in early 1949.





**ABOVE** After the war Alitalia acquired six state-of-the-art SIAI-Marchetti SM.95 four-engine airliners, the first two powered by Alfa Romeo 128 engines, but the remainder by Bristol Pegasus engines. This example, I-DALN, named Sebastiano Caboto, is seen at Northolt on the occasion of the airline's inaugural Rome—London flight in April 1948.

handful of crudely converted Martin Baltimore light bombers — the quasi-military *Corrieri Aerei Militari* (Military Air Couriers) carried 49,293 passengers and 666,500kg (1,500,000lb) of mail and cargo over a total distance of almost 2.2 million km (1.4 million miles) during the course of 44,000 flights and 8,000-plus flying hours. Although seemingly reluctant to hand over the reins to the civil sector, this organisation nevertheless provided a ready pool of experienced aircrews with which to re-establish Italy's airlines.

### THE RISE OF PRIVATE ENTERPRISE

In early 1946, with Allied Control Commission assent, the Italian Ministry of Aviation began seeking foreign partnerships to revitalise Italy's commercial aviation prospects. With the nation's commanding position in the Mediterranean, major international airlines were already staging through the country and were quick to recognise Italy's investment potential, especially for feeder traffic. American carrier TWA lost no time in signing an accord on February 11, 1946, giving it an equal 40 per cent stake in the creation of *Linee Aeree Italiane* (LAI), with the balance held equally by private investors and the *Istituto per la Ricostruzione Industriale*, the pre-war state body for administering nationalised industries.

The British, angered by TWA's refusal to allow their participation, and perceiving a violation of the principles of the 1946 Bermuda Agreement between UK and USA air carriers, quickly put together a rival. This was *Aerolinee Internazionali Italiane* (AII aka Alitalia), incorporated on September 16, 1946, with a 30 per cent holding by BEA, creating a second Italian state-sponsored carrier.

Even before the end of end of the war, as

German forces were retreating, several far-sighted groups and individuals had begun considering the resumption of peacetime airline operations. A process tentatively began in December 1945 with the formation of FEDAERA (Federation of Civil Air Transport National Enterprises) to represent the collective interests of its founder members, among which were several emerging companies that would play a key role in the rebirth of Italy's civil air transport.

At the beginning of 1946 several private civil aviation companies were already in existence in Italy, albeit only on paper. By the time of the mid-November closing date for licence applications to the newly constituted Directorate of Civil Aviation, some 34 submissions had been received and included several pre-war names. The elimination process whittled these down to just seven, deemed most likely to be able to sustain operations. These were ALI (still backed by Fiat), Aerea Teseo, Airone, Salpanavi, SISA, Transadriatica and LATI. Before even getting off the ground, however, they were severely handicapped: subject to high fuel and airport taxes and lacking any state aid, they were left with slim pickings in terms of routes. Despite fierce protestations, the Italian government, anxious to protect its investment, yielded to LAI's refusal to give up any of its lion's share of internal route allocations.

In the meantime the government had acquired 32 war-surplus Douglas C-47/C-53s languishing at Naples airport for an inclusive price of \$640,000. A number of these were to be allocated proportionately to the independents. The task of overhauling and converting these machines went to CMASA and Piaggio. Despite civil flights





LUIGINO CALIARO COLLECTION / TIMETABLE CAPT DACRE WATSON COLLECTION

**ABOVE** Aerea Teseo acquired a fleet of nine C-47s from January 1947, using them until operations were suspended in February 1948, when Salpanavi took the airline over. **RIGHT** An extremely rare July 1947 timetable for the very short-lived Aerea Teseo SA.

requiring a special permit, in early September 1946 Aerea Teseo conducted an illegal test flight between Naples and Florence's Peretola airport in C-47 I-ZOLI (in fact I-VEVE, falsely marked in honour of the company's President, Adone Zoli), commanded by chief pilot Pietro Gaggiano.

By early 1947 most of the outstanding problems facing Italy's airlines had largely been resolved, including the renewal of pilot's licences and the establishment of a joint ALI/Fiat civil aviation training school, and arrangements had been put in place to reinstate regional military-controlled aerodromes for civilian use. All was ready for the resumption of Italy's civil air routes by that April.

## AIRBORNE

First off the ground was LAI, headed by the former Director General of Civil Aviation, General Luigi Gallo, which launched a programme of inaugural flights for government and military dignitaries on April 12, 1947, from Rome's Urbe airport. Two days later, with seven of its allocated C-47s, services were opened to the public from the capital to Milan, Cagliari on Sardinia and Palermo and Catania on Sicily. Alitalia would have to wait until May 5 to get started with a fleet of four 18-passenger Fiat G.12CAs loaned from the military. The first Alitalia service, undertaken by G.12CA I-DALH between Rome, Turin and Catania, was flown by *Colonello* Virginio Reinero while he was still presiding over the military air transport service.

The independents were not far behind. Aerea Teseo SA, named after the wartime Teseo partisan group based near Florence, had been formed in the Tuscan capital in September 1945, headed by lawyer Zoli, who was determined to ensure that

his city would not be deprived of air services as it had been before the war. It became a joint-stock company in July 1946, with SIAI and Caproni-Taliedo among early major shareholders. An inaugural ceremony took place at Florence-Peretola on April 15, 1947, with C-47 I-BOLO bringing dignitaries from Rome before departing for Milan via Bologna. Shortly afterwards a second C-47, I-TORI, left for Rome, Reggio Calabria and Palermo with the airline's first load of revenue passengers.

On the same day in Sardinia, Airone got under way with two 22-passenger Fiat G.12Ls (I-AIRN and I-AIRO) on the Cagliari—Alghero—Rome and Cagliari—Milan routes, one flown by former SISA/LATI pilot Giuseppe Bertocci; five days later the island was also linked with Turin. Unfortunately, Airone was hampered by the ageing and increasingly unreliable Alfa Romeo engines on its aircraft, not improved until delivery of the third machine, I-SASS, powered by Pratt & Whitneys and thus designated G.12LP.

On April 16, 1947, ALI got going with an 18-seat Fiat G.12T (I-VIDA) loaned from the *Aeronautica Militare*, initially limited to flying between Milan and Rome. The introduction of three C-47s two months later permitted the opening of services to Naples, Cagliari, Reggio Calabria and Palermo. In addition, summer flights were undertaken to the





**ABOVE** Alitalia SM.95 I-DALL (c/n 11), named Marco Polo, over Rome. Four days after I-DALN's inaugural service from Rome to London in April 1948, I-DALL operated the first Rome—Milan—London—Manchester service. The SM.95 was built to be robust and — reputedly — SIAI-Marchetti test pilot Aldo Moggi made a series of loops in one.

coastal resorts of Albenga, Rimini and Viareggio.

Transadriatica's five C-47s also took to the air in April, with a daily service from the airline's home base at Venice to Rome via Padua, extended six times weekly to Pescara and Pescara—Ancona—Brindisi—Catania thrice weekly. Based in the then-disputed territory of Trieste in north-eastern Italy, SISA re-established services on June 8, 1947, between Rome, Milan and Naples with six C-47s.

The smallest of the eight companies was SpA Salpanavi, backed by the Salpanavi shipping company of Milan, which almost immediately ran into difficulties. On the strength of its route allocation — Milan to Rome, Alghero and Bari — it had ordered three new 33-seater SIAI-Marchetti SM.95s. On July 19, 1947, with I-SALP poised to depart on the inaugural service, Salpanavi was faced with an official directive prohibiting the use of a four-engined aircraft on this run, leaving it to arrange the urgent loan of a DC-3 from SISA. It was further specified that when Alitalia commenced its Milan—Bari—Catania service, Salpanavi would have to terminate at Ancona, some way short of the intended

destination — and, moreover, make an enforced halt at Grosseto en route to Rome. Stymied before it really got going, Salpanavi saw two of its intended SM.95s reallocated to rival Alitalia, while the third went to the Italian-backed *Services Aériens Internationaux d'Égypte* (SAIDE).

Although not a scheduled carrier, another name revived from the pre-war period, *Aero Espresso Italiana* (AEI), had begun flying on June 15, 1947. By the end of November that year it had flown some 264,186km (164,150 miles), uplifting 1,856 passengers and 26,000kg (57,320lb) of cargo and newspapers. This was a considerable achievement bearing in mind the limitations of its equipment: a hotch-potch fleet of Avia FL.3 and Macchi MB.308 lightplanes, a pair of Republic Seabee amphibians, a single Noorduyt Norseman and seven war-surplus Fairchild UC-61Ks (military Fairchild Argus/24s).

By the end of 1947, despite a lack of up-to-date facilities and airfields, a rudimentary network of domestic air services had nevertheless been established. Although a short industry-wide wage strike earlier in the year had grounded all

**BELOW** Trieste-based SISA operated a total of six C-47s — I-COSA, I-LUNA, I-NAVE, I-SOLE, I-VARO and I-VELE — during its brief post-war existence, four of which are seen here. Nearest the camera is I-SOLE, which joined SISA in May 1947 and later served with ALI-FR and LAI (as I-LOTT) before joining the Italian Air Force in 1955.

LUIGINO CALIARO COLLECTION





**ABOVE** Alitalia's British partner BEA provided the Italian airline with one Avro Lancaster (for training) and five Lancasterian 3s for its long-distance routes. Formerly G-AHCE, Lancasterian I-DALR, named Borea, operated Alitalia's inaugural Milan—Buenos Aires service via Dakar, Natal, Rio de Janeiro and São Paulo on June 2, 1948.

carriers for a few weeks, LAI's statistics were indisputably superior. It had flown around 45,000 passengers and 225,000kg (496,040lb) of mail and freight over 1,000,000km, while Alitalia had achieved an average load factor of 48.5 per cent, carrying 9,415 passengers on its scheduled services over the course of nearly 2,000 flying hours. Of the independents, SISA had achieved a 59.5 per cent load factor, carrying 16,657 passengers and almost 38,000kg (83,776lb) of cargo, mail and newspapers with a 96.2 per cent on-time factor during April–October. Over a similar period, Airone carried 6,661 passengers and 8,856kg of cargo, while Aerea Teseo transported 34,768 passengers and 223,000kg (41,630lb) of freight over 500,000km (310,700 miles).

## INTERNATIONAL ROUTES REOPEN

On February 10, 1947, the Treaty of Peace with Italy (one of the Paris Peace Treaties) was signed, formally ending hostilities. As a result, Italy was again free to restart flying beyond its own shores. First away was Alitalia on July 6 with SM.95 I-DALM carrying a Norwegian group

from Rome to Oslo via Frankfurt. From August 1948, in addition to Paris, London, Nice, Geneva and Lisbon, Alitalia's route map included Tripoli in Libya, Cairo in Egypt and Asmara in Eritrea, the longer runs accomplished with a fleet of four Avro Lancasters.

Over at LAI, its overseas network covered Tunis, Alexandria, Athens and Istanbul. Around the same time all airline services, apart from a few domestic lines, were switched from Rome's Urbe airport to the recently demilitarised Ciampino.

As with domestic routes, the international scene was carved up mainly between the two state-controlled carriers — LAI and Alitalia — again disadvantaging the independents. Transadriatica had managed a special flight between Venice and Zürich in Switzerland in October 1947, and a scheduled service began over this route two months later. Aereo Teseo was confined to the occasional charter flight, initially flying a one-off to Barcelona. In late November 1947 it carried the Italian national tennis team to Stockholm. Faring somewhat better, SISA was able to return to its old stamping ground with scheduled services

**BELOW** The sheer post-war ubiquity and availability of the C-47 in Europe meant that much of the workload of Italy's post-war airlines was undertaken by the type. LAI operated some 26 examples from 1947 until 1957, when it was put into liquidation and its assets acquired by the government for redistribution to the state-owned Alitalia.







LUIGINO CALIARO COLLECTION

**ABOVE** In July 1949 LATI inaugurated a fortnightly service between Rome and Caracas in Venezuela with a fleet of three SM.95s — I-LAIT, named Sant'Antonio, I-LATI San Francesco (seen here) and I-LITA San Cristoforo. With the loss of I-LATI in November 1949, the remaining two SM.95s were taken over by Alitalia when LATI ceased operations.

to Prague, Athens, Istanbul and Beirut, together with Marseille via Genoa.

Overtaking the wartime decree that had merged LATI and Ala Littoria, the new government effectively reinstated LATI in September 1946, although it lacked any tangible funds or equipment. However, when overseas routes were officially determined in December 1947, LATI was not to return to its former destinations in South America. Instead it was allocated a route to Santo Domingo in the Dominican Republic via Lisbon, Ilha do Sal in the Cape Verde Islands, Paramaribo in Suriname and Caracas in Venezuela. A service to Mexico City was served by way of Barcelona, Lisbon, the Azores, Bermuda, Miami and Havana.

The plum route to Rio de Janeiro and Buenos Aires went to Alitalia, first flown by Lancastrian on June 2, 1948. This situation came about because of LATI's controversial history in South America and an ongoing wrangle with the Brazilian government over assets seized in 1941. The rejuvenated carrier started flying once more in the first half of 1949, employing three SM.95s, registered I-LAIT, I-LATI and I-LITA. But instead of timetabled services, much of its activity was restricted to non-scheduled flights, especially carrying Italian workers to Caracas, where an oil boom was offering much improved prospects. By this time, however, it had to route via Dakar in Senegal instead of through Ilha do Sal, after the Portuguese government had revoked the concession and dismantled the facilities there. It was unfortunate that after only a few months, SM.95 I-LATI crashed at Villa Cisneros (now Dakhla in Western Sahara) while attempting an emergency landing following engine failure in November 1949. Resisting mergers with *ALI-Flotte Riunite* (of which more shortly) and Alitalia,

LATI somehow kept going until early 1951 and remained in existence (on paper) until repatriation settlement terms were finally agreed with Brazil.

## THE END OF THE INDEPENDENTS

Italy's post-war independent airlines never really stood a chance commercially, and it was not long before the first casualties succumbed. Throughout its brief existence Aerea Teseo had struggled financially, and continual boardroom battles over shareholding and capitalisation failed to resolve its problems. Operations were suspended in February 1948 and a new board was convened when Salpanavi became the major shareholder, after its own operations failed to get going.

It was only a short reprieve, however, for on February 20, 1948, the airline suffered a serious fatal mishap, when DC-3 I-REGI crashed into the high ground of Collesalveti between Pisa and Livorno. En route from Florence to Rome, it had been diverted to Pisa to emplane passengers from another unserviceable aircraft, but by the time of the delayed departure the cloudbase had lowered significantly. The accident and attendant negative publicity helped seal Aerea Teseo's fate and it was declared insolvent with a deficit of 1.3m lire and shut down in June 1948. Salpanavi remained in existence for a little longer, supplying three DC-3s and crews for the formation of Yemen Airways.

Of the remainder, only the Fiat-backed ALI, with several significant European routes, appeared to be holding its own. In February 1949 the airline announced that it had absorbed the remaining carriers — Airone, SISA and Transadriatica — under the title *ALI-Flotte Riunite* (ALI-FR — ALI United Fleet). The combined fleet of seven Fiat G.12/G.212s and a dozen C-47s covered a scheduled network encompassing Amsterdam,



**ABOVE** Fiat G.212CP I-ENEA had a long and varied career, serving with ALI-FR before going to France, returning to Italy in 1952 to operate with independent air carrier SIPTA, with which it made several flights from Italy to Hong Kong. A later photograph of this machine as G-ANOE appeared in Beirut: Lebanon's Propliner Paradise in TAH14.

Athens, Barcelona, Beirut, Brussels, Nice, Paris, Prague and Vienna, served regularly from Italy's main cities.

The newly minted ALI-FR got off to a bad start on May 4, 1949, with the crash of Fiat G.212 I-ELCE, which struck the Basilica at the top of the 672m (2,205ft) Superga hill on approach to Turin in low cloud, killing all 31 on board. The press had a field day, for the majority of the occupants comprised the entire Turin football team returning from a friendly match with Benfica in Lisbon.

ALI-FR's five Fiat G.212CP "Monterosa" aircraft had been purchased from Alitalia. Three of the four survivors briefly carried French registrations while temporarily in the colours of French charter airline Cie Air Transport, before being returned to the Italian civil register and onward sale abroad after ALI-FR folded. One G.212CP had a particularly interesting interlude after returning from France. For a short while it was in the employ of *Società Italiana per il Trasporto Aereo* (SIPTA), an obscure outfit created by a Signor Brenner, who ran an import-export business in Milan. He bought G.212CP I-ENEA in April 1952, and on June 7 the same year it left Milan for Hong Kong loaded with medical supplies. On the return flight to Italy it carried Italian expatriates who had been detained by the Chinese. At least one more return flight was made to Hong Kong before I-ENEA was sold to Arabian Desert Airlines, with which it was registered G-ANOE in late 1953.

The amalgamation lasted until December 1951 when ALI-FR, having already ceased flying to Paris, Brussels and Rome, finally succumbed to financial difficulties. Nearly all of its assets, including nine C-47s, were sold to LAI for 400m lire. That September there had been an attempt

to form a new company to continue SISA's international routes. Trieste Airways planned to employ a fleet of Martin 2-0-2s and DC-3s, but conflicts of interest and concerns over foreign funding doomed the venture before it got started.

## LAST TWO STANDING


This left LAI and Alitalia to battle it out over the international long-haul market. The former stole a march on its rival by purchasing three Douglas DC-6s, obtained through a substantial loan under the USA's European Recovery Program (Marshall Plan), enabling the opening of a prestige service to New York late in 1950. Unable to access these funds, Alitalia acquired four DC-4s from Pan American, which gradually superseded the ageing Lancastrians and eventually allowed extension of the network down to Johannesburg.

For some time there had been periodic calls for the two state-sponsored carriers to be amalgamated, and these gathered pace after LAI suffered two fatal accidents in short succession at the end of 1956. On November 24 DC-6B I-LEAD inexplicably lost altitude and struck a house seconds after take-off from Paris-Orly, while on December 22 C-47 I-LINC, flying from Rome to Milan, hit Monte Giner 195km (120 miles) northwest of its destination. The aircraft was way off its planned IFR route and there seems to have been some confusion between ATC sectors over who was responsible for the flight. These two accidents accounted for 55 fatalities and the subsequent enquiry heavily criticised LAI over safety concerns and crew training, while also censuring the country's ATC system for many deficiencies. Despite a subsequent management shake-up, the outcome was that LAI was



**ABOVE** Alitalia acquired converted former Pan American C-54 I-DALT in March 1950, naming it Città di Milano, although LAI was able to obtain funds to secure the purchase of three pressurised DC-6Bs, including I-LOVE, seen **BELOW** at Rome. **BELOW RIGHT** Characteristically stylish late 1950s Italian timetables from LAI and Alitalia.

voluntarily liquidated on October 31, 1957, with its capital and assets, including aircraft, acquired by the state for transfer to Alitalia.

The early post-war commercial aviation scene in Italy had mirrored that of the pre-war period, with small independent carriers playing their valuable part in returning the country to stability, but ultimately giving way to the creation of a single state-controlled flag carrier — Alitalia. 

DAVID H. STRINGER COLLECTION



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# TWO DAYS IN FEBRUARY



## THE SIDI BOU ZID AIR WAR PART 2

In the concluding half of his examination of the air activities of both the USAAF and Luftwaffe in support of the vital operations by ground forces in central Tunisia during February 14–15, 1943, **Dr ANDREW ARTHY** details the air war over the battlefield during the second day of fighting, bookended by daring tactical raids on the airfields of both sides

**T**HE AMERICAN 1st Armored Division's counterattack at Sidi Bou Zid would be the most significant event in the ground war on February 15, 1943. However, the wily veterans of the German 10. and 21. *Panzer-Divisionen* were well-prepared for the American counter, ensuring that it was doomed from the start.<sup>1</sup> Once again, the Luftwaffe would play an important role in the day's events.

The weather in central Tunisia on the 15th was much better than the previous day, with visibility good and only minimal haze. Although missions were flown by both sides throughout the day, the air war of February 15 was bookended by two spectacular events: a daring low-level German fighter attack on Thelepte airfield in the morning and a destructive American bomber raid on the Germans at Kairouan airfield in the afternoon.

Recognising the importance of Thelepte to the

Allies, the Germans sent out an early morning air strike to disrupt operations from the airfield. However, with Focke-Wulf Fw 190 fighter-bomber unit III./SKG 10 back in the north, Messerschmitt Bf 109 fighter-bomber unit I./SchG 2 focused on the southern front, and the Stukas of StG 3 too slow and vulnerable for such a mission, it was left to the Bf 109s of fighter unit JG 77 to undertake a strafing attack. Major Joachim Müncheberg's *Geschwader* had enjoyed a surprisingly quiet opening day of the battle (see Part 1 in *TAH32*), but its involvement in this raid would result in a memorable morning for many German and American servicemen.

### DAY TWO BEGINS

A total of 23 Bf 109G-2s of JG 77, drawn from the I. and III. *Gruppen*, took off from Fatnassa and Matmata respectively at 0705hr to fly this

**BELOW** Supermarine Spitfire VC/Trop ES306, coded HL-D, of the 308th Fighter Squadron (FS), 31st Fighter Group (FG) at Thelepte in March 1943, shortly after the air war over Sidi Bou Zid. The Spitfire VC was armed with two Hispano 20mm cannon of 120 rounds each, mounted in the wings inboard of four Browning 0-303in machine-guns.

VINCENT VIA AUTHOR





**ABOVE** A Messerschmitt Bf 109G-2 of I./JG 77 at Gabès airfield in Tunisia in 1943. Given the name Herz As (“Ace of Hearts”), Jagdgeschwader 77 served in all German theatres of operation during the Second World War, from Western Europe to the Eastern Front, from Norway in the north to the Mediterranean and North Africa in the south.

attack. They swept in over Thelepte at very low level and caught the Americans completely by surprise. Pilot Harry C. Strawn of the USAAF’s 309th Fighter Squadron (FS)/31st Fighter Group (FG) was eating breakfast when two warning shells were fired by a nearby anti-aircraft gun. He immediately scrambled for cover, his plate of powdered eggs thrown to the ground. *Leutnant* Armin Köhler of 2./JG 77 was one of the strafers, and he recorded in his diary:

“0700hr [sic], low-level attack on Thelepte. The flak over the field is awful. We make our approach out of the sun. As we roar over the runway, Spitfires are sighted, but we get back safe and sound. Kühndorf [of 2./JG 77] opened fire on a Kittyhawk as it was taking off. Meschke [also 2./JG 77] knocked out an anti-aircraft position.”

The German pilots reported four Douglas A-20s set on fire on the ground by machine-gun and cannon fire, and they also believed that six A-20s and eight fighters were shot up so effectively that their destruction was guaranteed. In addition to the anti-aircraft position shot up by *Oberfeldwebel* Heinz Meschke, during the return flight a truck was strafed and destroyed by the Bf 109s, which also shot up a train and destroyed the locomotive. As the Bf 109G-2s made their escape from the

target area, however, they were intercepted by three separate groups of Allied fighters. The German pilots reported combat at Thelepte with ten Spitfires and Curtiss P-40s, and claimed three of the former and one of the latter shot down. *Hauptmann* Heinz Bär was responsible for two of the victories, the 155th and 156th of his career.

The raid occurred as the Allies were beginning the day’s air operations from Thelepte, and surprise was complete. There was no radar at the airfield, nor any other early-warning system, so the Allies relied on standing patrols of fighter aircraft to protect the base against attack. On this occasion, some American pilots airborne on army-support operations were also able to intervene.

At 0735hr a dozen 309th FS Spitfires, led by Maj Harrison R. Thyng, took off from Thelepte No 1 to escort eight Bell P-39s of the 346th FS/350th FG on a strafing mission to the Sidi Bou Zid area. The P-39s formed up near Thelepte No 2 and flew to Thelepte No 1 to meet their escort, but things did not go according to plan. In one of the P-39s was 2nd Lt Hugh D. Dow, who recalled:

“We arrived over the airfield at 500ft [150m] or so just as a flight of Bf 109s hit it. The ‘109 drivers were obviously unaware of our presence, as we were of theirs, until a few balls of flame sprouted



**ABOVE** The Bell P-39 equipped the 81st and 350th FGs and two squadrons of the 68th Observation Group in North Africa from the end of 1942. Interestingly, the dark circle just aft of the bottom of the cockpit door reveals that this example, "Mike", is actually a P-400, the circle being a dark blue formation light fitted only to the RAF's Airacobra I.

up below us. [Squadron CO] Capt John Robertson was leading our P-39s and Capt Charles F. 'Chuck' Hoover was my flight leader. The '109s pulled up after they had made a strafing pass across Thelepte No 1 and whatever their intentions were thereafter, they got changed rather suddenly. We, of course, were as surprised as they were but our advantage was we were over our own air patch while they were probably 100 miles from home."

The 309th FS Spitfires were in a prime position to attack, and they dived from 2,000ft (600m) on to the fleeing enemy aircraft. Captain Charles C. Kenworthy Jr attacked a Bf 109 and scored numerous hits on its wings and fuselage. The aircraft was seen to be in flames, but, because he was unable to follow it down, he only claimed a probable, a claim later upgraded to destroyed. Thyng engaged and destroyed another Bf 109. Four other pilots also fired at the enemy, and Lt Berry Chandler was later credited with a Bf 109 damaged, which he attacked from 150yd astern with cannon and machine-guns. As in the previous day's fighting, the Spitfire pilots found that their cannon and machine-guns were largely unserviceable owing to ingress of sand. There were no casualties in the 309th, and the 12 Spitfires landed at 0800hr.

Meanwhile, the P-39s also successfully fought with the German fighters, 2nd Lt Dow initially attacking and damaging a Bf 109, as he recalled:

"Chuck Hoover pulled up in a steep, hard-climbing left turn, firing at a '109. I left Hoover on his own and jumped on the wingman with a long burst before I had to break off to keep from stalling out. I had a lot of strikes on him but no smoke or flame."

### THE 'COBRA BITES

Hoover subsequently claimed a Bf 109 destroyed at Thelepte No 1. Dow then successfully attacked another Bf 109:

"I lost sight of the first '109, but as I headed for the ground picking up speed I saw another '109 off to my right and about 500yd ahead. He was getting the hell out of there and was heading for the deck. I poured the coal to the Allison [engine] and fell in trail behind him. He obviously didn't know where he was going because he headed straight for our airfield at Thelepte No 1,<sup>2</sup> which wasn't the best choice. However, this did give all our groundcrews a grandstand view as we boiled straight across the middle of the field.

"I was slowly gaining on him, but not much. I had a lot of detonation [spontaneous combustion inside an engine cylinder after the spark plug fires] at full power; after a while I brightened up enough to pull the throttle back some, which smoothened things out and gave me a few more miles per hour. I don't believe the '109 pilot knew I was there; he was by himself, a long way from





**ABOVE** Lt Berry Chandler of the 309th FS, 31st FG, was credited with damaging a Bf 109 of JG 77 during the latter's attack on Thelepte No 1 on February 15.

home, with a lot of enemy fighters unexpectedly overhead. He was undoubtedly afraid and trying to put as much distance as possible between his bird and the enemy airfield.

"I had decided that I would wait until I was right on top of him before giving him a blast. He had drifted up to 200–300ft [60–90m] by now and must have finally seen me, because he suddenly hit the deck again. I dropped down immediately and, as I bounced around in his slipstream, finally squeezed off a burst. There were strikes all over the aircraft and I overran him as his power came off. A few seconds later as I chopped power and rolled up to look at him, he hit the ground in a ball of smoke and dust."

After landing, Dow claimed a Bf 109G destroyed and another damaged. The interrupted P-39 strafing mission was successfully completed later in the morning.

The third group of Americans to intercept the raid were from a 308th FS/31st FG standing patrol of four Spitfires, which saw the enemy approaching along the railway north-east of the aerodrome. First Lieutenants Alvin D. Callender and Joseph C. Reed were patrolling at 4,000ft (1,200m) and dived on the German aircraft. Callender fired a good burst at one from astern, with machine-guns only because his cannon was unserviceable; the enemy aircraft was set on fire and was seen to go in, so he claimed one "Fw

190" destroyed. Lieutenant D.K. Smith attacked what he thought to be an Fw 190 and saw strikes, and claimed his adversary damaged.

## FRESH CLAIMS

While Callender and Smith successfully engaged the German fighters over Thelepte, Reed was not so lucky. His aircraft was hit by fire from an enemy fighter at low altitude and burst into flames, crashing three miles (5km) north of the airfield. He was able to pull up to avoid a British anti-aircraft gun emplacement, but hit the ground just beyond it and was killed. Reed's crash was witnessed by Sgt Ralph J. Thimmesch of the 346th FS/350th FG's ground personnel: "He never had a chance — pilot and 'plane crashed and went up in a ball of smoke".

A fourth group of Americans — another patrol from the 308th FS — sighted the JG 77 raiders but was unable to engage. Altogether, the 31st FG claimed two Bf 109s and one "Fw 190" destroyed, and an "Fw 190" and a Bf 109 damaged. These were the unit's first aerial victory claims since November 8, 1942, the opening day of the North-West African campaign. The airfield anti-aircraft guns claimed one enemy aircraft destroyed, and the P-39s claimed two destroyed and one damaged, making the total American claims six Bf 109s and "Fw 190s" destroyed, three damaged.

Thimmesch gave a description of the raid itself, as seen from the ground at Thelepte No 2:

"Capt Hoover shot down a German 'plane right over the field while we were on our way to breakfast with the 81st FG (we had no chow facilities). Never thought so many guys could try to get into a two-man foxhole at one time! The action that day was all on the deck just like in an old World War One movie."

The Americans suffered a number of losses on the ground at Thelepte, albeit not as great as the subsequent Luftwaffe claims. Six Spitfires of the 307th FS/31st FG and two A-20Bs of the 47th Bomb Group (BG) were damaged by strafing, and one older DB-7 variant from the 47th BG was set on fire, later exploding. Pilot Lt Jack P. Ford of the 307th FS was in his Spitfire at readiness on the ground at Thelepte when the attack occurred; he was hit in the leg as he dived out of the aircraft and was sent to hospital near Youks-les-Bains.

In reality, no Fw 190s had been involved, and just one German aircraft was lost, with another Bf 109 making a forced landing in friendly territory. Austrian *Unteroffizier* Karl Reinbacher (aged 22) of 8./JG 77, flying Bf 109G-2 "Black 4 + I", was initially posted missing by his unit. He was shot down at 0800hr and was taken prisoner with slight wounds after having been downed 9½ miles (15km) east of Thelepte as he tried to escape his pursuers. Hugh Dow headed out in a jeep to



**ABOVE** An unknown serviceman poses beside Spitfire VB/Trop WZ-X of the 309th FS, which bears the name Beverly the Second alongside a circular insignia depicting a running skeleton and the legend "The Phantom" beneath the cockpit. The 309th traded its Spitfires for the longer-range Mustang in late March–early April 1944.

collect Reinbacher, but on arrival noted that there "was already another jeep there with four French soldiers guarding the German pilot, who was sitting on the ground with a bandage on his head". Dow scavenged the rudder and instrument panel clock from the downed Messerschmitt, and took Reinbacher back with him to Thelepte.

The strafing attack by JG 77 on Thelepte was a partial success, and demonstrated the difficulties of countering such hit-and-run low-level attacks. One of the major participants deserves to have the final say on this mission. Dow later reflected:

"When you look back on it that was a very bold and daring raid by the Germans, sending so few aircraft against an airfield complex with six or seven enemy fighter squadrons — considerably depleted, of course. Obviously, they were counting on having the element of surprise in their favour and had they been 10min earlier they would have had it."

## NORMAL SERVICE RESUMES

After this early drama had unfolded at Thelepte, regular air operations commenced. A P-39 mission that had previously been postponed owing to ice on the aircraft was able to get airborne at 0830hr, signalling the start of the efforts of XII Air Support Command (XII ASC) for the day. The 81st FG strafed successfully near Sidi Bou Zid, and no enemy aircraft were seen. It was more than an hour before the next American mission began, once more with 81st FG P-39s, led by Capt Elton J. Giusti, escorted by 31st FG Spitfires, with

two of the former damaged by anti-aircraft fire while strafing trucks in the battle area.

The next XII ASC mission was also one of the most eventful of the day, as the 307th FS, led by 31st FG CO Col Fred M. Dean, escorted six 81st FG P-39s to the Sidi Bou Zid area. At 1200hr they were attacked by six German aircraft, with Lt Henry F. Huntington's Spitfire damaged. The American fighter pilots claimed one enemy aircraft destroyed and four damaged, despite more problems with cannon jamming owing to sand. The victor was 1st Lt Jerry D. Collinsworth, who later recalled his success:

"I made a tight, quick turn inside the other two Spitfires in my flight and faced the lead Fw 190 [sic] alone. By the time I got around, I could see sparklers flying from the German airplane. That made me mad. This guy was really trying to kill me. The Focke-Wulfs [sic] had jumped our oddball flight, just like I knew they would. But I wasn't scared; I was angry. I thought, 'You so-and-so! If you can dish it out, I can too.'

"With that, I pushed the firing button and squeezed the cannon trigger. The guns fired, but nothing seemed to happen. I was so green that I forgot it took a bullet time to go from point A to point B. Anyway, I shot at him and he belly-landed into the desert. I was excited. I yelled 'I got him! I got him!' But when I got off the mike, this calm voice told me to shut up. That was the 307th FS's first confirmed victory of the war, and other pilots on the mission damaged four other German fighters."



**ABOVE** Five of JG 77's most experienced pilots discuss the air campaign in Tunisia in February 1943. From left to right: Geschwaderkommodore Joachim Müncheberg; Heinz "Pritzi" Bär; Kurt Ubben; Emil Omert and Diethelm von Eichel-Streiber. Credited with 135 victories, Müncheberg was killed in combat in Tunisia the following month.

The 31st FG had come up against III./JG 77, and the Gruppe reported a Bf 109G suffering 35 per cent damage in combat with enemy fighters near Sidi Bou Zid, although the pilot was unhurt. Huntington had been attacked by the *Gruppenkommandeur*, Major Kurt Ubben, who claimed his 106th aerial victory at 1201hr.

Soon afterwards, at 1210hr, 308th FS Spitfires took off from Thelepte to escort P-39s of the 81st FG back to the battle area to carry out strafing attacks and provide continuous cover over Allied troops. There was heavy anti-aircraft fire at the target, and during the return flight the P-39s were fired on by friendly forces, which damaged one.

## THE COUNTERATTACK

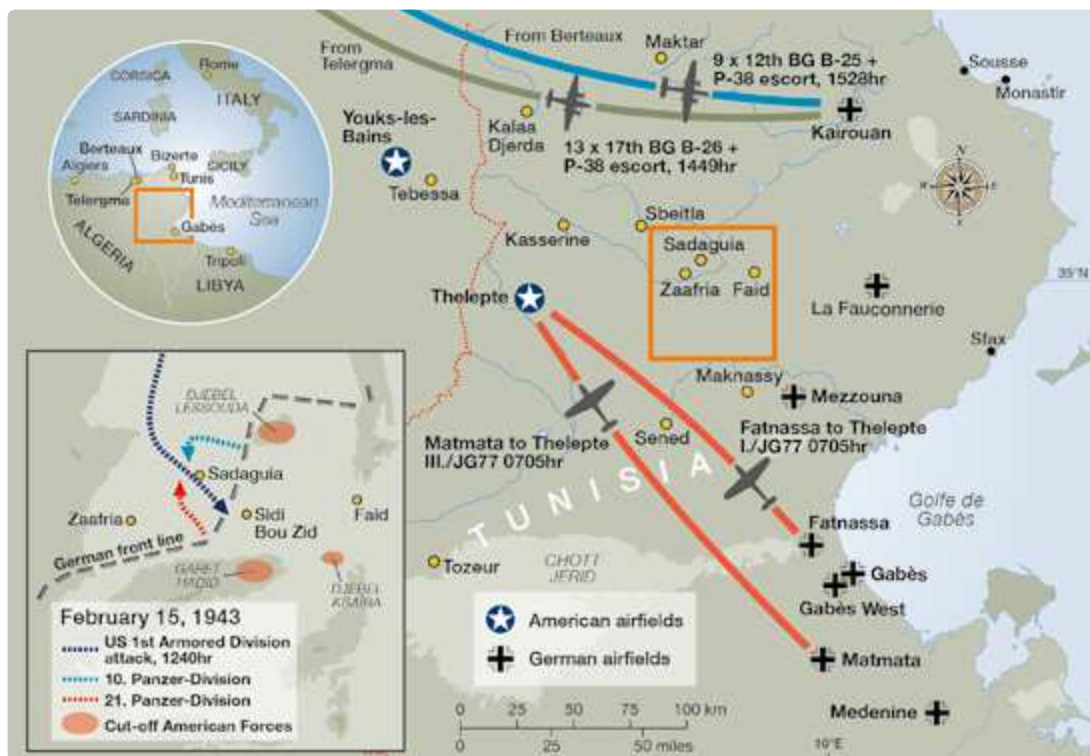
The American troops earmarked for the counter-attack had reached their assembly area by 0945hr, but then took several hours to reorganise. Combat Command C and Combat Command B's 2nd Battalion of the 1st Armored Regiment were to drive south-east towards Sidi Bou Zid to destroy Axis armour, while also aiding the withdrawal of the 168th Infantry Regiment from Djebels Lessouda and Ksaïra. However, the force was far too small to hope to achieve its objectives. During the morning Luftwaffe aerial reconnaissance had spotted the approaching Americans, confirming existing German thinking about a counterattack aimed at the newly captured village, and allowing the latter to finalise defensive preparations.

The American attack began at 1240hr, driving recklessly for Sidi Bou Zid with tanks in the

lead, creating large dust clouds. All morning the Stukas of StG 3 had been held back by *Fliegerkorps Tunis*; but, with the enemy attack under way, they were now unleashed. Once more they caused immense confusion among American troops and tanks. The unit despatched 17 Stukas on two missions between 1300hr and 1500hr, and they played a vital role in disrupting the American counterattack. As the Americans crossed the first dry gully near the village of Sadaguia, they were bombed by the Stukas, and then bombed and strafed as they crossed the second gully. When they reached the third gully the German anti-tank guns opened fire. The American half-track tank-destroyer platoon on the left flank entered Sadaguia, and was hit by a dive-bombing attack by StG 3.<sup>3</sup> The German pilots reported fires and heavy smoke, with the target well-covered by bombs. Escorting Bf 109s from JG 77 then joined in with strafing attacks, and claimed numerous targets damaged and destroyed.

In the meantime XII ASC did what it could to support the counterattack, with the newly arrived Spitfire-equipped 52nd FG flying its first mission to Sidi Bou Zid at 1355hr, escorting four 68th Observation Group (OG) P-39s and covering the ground forces. However, no German aircraft were seen. Earlier in the day, the 52nd FG had been preparing for its usual uneventful transport-escort missions when it received instructions to move forward immediately to Thelepte (the 52nd FG's 2nd FS and 4th FS) and Youks-les-Bains (5th FS), to come under the control of XII ASC.





MAP BY MAGGIE NELSON

In the event, the Luftwaffe raid on Thelepte in the morning was only a pinprick compared to what the Americans were to inflict on the Axis airfield at Kairouan in the early afternoon.

## PAYBACK AT KAIROUAN

With the situation rapidly becoming desperate both in the air and on the ground, the fledgling American strategic bomber force was called into action. Having spotted a large number of aircraft at Kairouan the previous day, XII ASC asked for a strike by XII Bomber Command. Medium-bombers had already been promised to XII ASC for February 15, and were thus assigned the mission. A Lockheed F-4 (photo-reconnaissance P-38 Lightning) of the 3rd Photographic Group (PG) flew a pre-raid recce mission to Kairouan between 1020hr and 1405hr, spotting a number of aircraft there on the ground and in the air.

Kairouan was still being developed as an operational airfield, with the aircraft revetments only half-finished. Locals refused to work owing to the threat of Allied bombing, and various supplies were difficult to obtain; as a result there was a large number of aircraft on the airfield, but only a small number of revetments. To make matters worse, Fw 190 unit III./SKG 10 arrived back at Kairouan at 1440hr, tasked with taking part in the German efforts against the American armoured counterattack.

The first strike against Kairouan occurred at 1449hr, by 13 Martin B-26s of the 17th BG from Telergma in Algeria, escorted by 20 P-38s of

the 82nd FG, also based at Telergma. The B-26s dropped 1,434 x 20lb fragmentation bombs on target, completely covering the airfield, and two German aircraft taking off were seen to be hit by bombs. As the 17th BG reached the target the crews saw six to nine aircraft scrambling and climbing to attack. In response, the P-38s formed a defensive circle and prevented the Germans from getting to the bombers. Just before the defensive circle was formed, 2nd Lt William J. Sloan of the 96th FS was able to down a Bf 109 as his fifth victory, to become an ace, and 2nd Lt Thomas A. White from the 97th FS downed an Fw 190.

As the American formation withdrew to the west it was pursued by enemy fighters, which attacked the rear aircraft, and a P-38 returned to base on one engine, having sustained damage to the starboard wing. A fellow 82nd FG pilot wrote in his diary: "Jackson came back on one engine. Got hit between the right boom and the gondola. A hole as big as a football". One B-26 returned with its bomb-bay doors open owing to damage sustained, and made a forced landing; but other than that, the B-26s and P-38s were unscathed. They reported columns of black smoke rising high into the sky as they left the target area.

The second strike was at 1528hr by nine North American B-25s of the Berteaux-based 12th BG, escorted by 16 P-38s of the 1st FG at Chateaudun-du-Rhumel. The B-25 crews saw three aircraft on fire from the previous raid, and dropped nearly 600 x 20lb fragmentation bombs along the runway and in dispersal areas. They were attacked by



German fighters 10min after bombing, and two Bf 109s were claimed destroyed by the P-38s. Captain Newell O. Roberts of the 94th FS/1st FG was one of the victors and recalled:

"About eight miles [13km] north of Kairouan, at about 14,000ft [4,000m], I saw six to eight Bf 109s. One started to dive down on my flight. I turned up into him. He then turned away and I got on his tail at about 600yd. I gave him several long bursts and saw a lot of black smoke pouring from him. I then turned away from him in order to engage the other Bf 109s and lost sight of him. I believe that he crashed."

The B-25 gunners, including 19-year-old S/Sgt Van Natta Dalhouse, claimed several victories in the combat. In exchange, one B-25 was badly damaged by anti-aircraft fire from Kairouan, and went down 45min north-west of the target, having been finished off by German fighters.

With minimal warning of the raid, the Fw 190s of II./JG 2 scrambled at 1445hr, although while taking off *Unteroffizier* Rudolf Weitgruber of 6./JG 2 collided with a Bf 109 from the 2nd *Staffel* of *Nahaufklärungsgruppe* (Heer) 14 — 2.(H)/14 — and was injured. His comrades engaged the formation and claimed an astonishing ten P-38s and three Spitfires destroyed, plus one B-25 damaged, including seven victories by Hptm Rudorffer, three by *Oberleutnant* Kurt Bühligen, two by Ofw Kurt Goltzsch and one by Lt Fritz Karch. Two Bf 109s of the *Geschwaderstab* (Group HQ Flight) of JG 53 also scrambled, and *Feldwebel* Wilhelm Gsteu claimed the first victory of his

**ABOVE** The Focke-Wulf Fw 190As of II./JG 2 had arrived in North Africa in mid-November 1942, and by February were based at Kairouan in Tunisia, where facilities and protective revetments were somewhat primitive. As a result, the unit suffered a number of losses on the ground during the USAAF bombing raids during the afternoon of February 15.

career, a B-25. As noted above, only one B-25 was actually lost, with a B-26 and a P-38 damaged. Exactly what II./JG 2 was "shooting down" is unknown, but the unit's claims seem to have involved a great deal of imagination. Two Fw 190s of II./JG 2 were damaged in the combat and had to make forced landings, but neither pilot was wounded.

## THE RESULT

On the ground, the results of the two strikes were devastating, the fragmentation bombs causing widespread damage. Four Fw 190s of II./JG 2 and III./SKG 10 were badly damaged or destroyed, two were moderately damaged, three were damaged by splinters, and three were slightly damaged. One Bf 109 of 2.(H)/14 was 20 per cent damaged and a Ju 87 at the airfield was slightly damaged, making a total of 14 aircraft hit by the raid. The 4./JG 2 *Gefechtsstand* (Combat HQ) was hit and burnt out, destroying the whole fighter-control installation at the airfield. One member of 4./JG 2's ground personnel was killed, and a fuel depot was gutted.

This was not the first time the Americans had successfully targeted a Luftwaffe air base

during the Tunisian campaign, and it would not be the last.<sup>4</sup> Luftwaffe orders came through on the night of February 15–16 that no ground-attack or reconnaissance aircraft were to transfer to Kairouan on the 16th, demonstrating the effectiveness of the XII Bomber Command strike.

Meanwhile, the USAAF tactical units continued to support the doomed counterattack, with missions sent out at 1440hr, 1455hr and 1545hr. On these operations, aircraft of the 31st, 52nd and 81st FGs covered army units and strafed various ground targets; only two P-39s were damaged by anti-aircraft fire.

At around 1530hr the American tanks reached the outskirts of Sidi Bou Zid, where they were very quickly halted by converging German attacks from the north (10. Panzer-Division) and south (21. Panzer-Division). By 1740hr the Americans were desperately trying to escape encirclement, but all of their tanks were lost, along with many officers and enlisted men. Once more, the Luftwaffe played an important role in blunting this attack.

## THE FINAL ATTACKS

The Ju 87s of StG 3 were sent out on their final mission of the day at 1540hr, with nine Stukas targeting vehicles and tanks near Sadaguia. This was another effective attack, causing considerable confusion among Combat Command C infantry moving forward in the area. An experienced Stuka crew from 9./StG 3 had to make a forced landing owing to hits from groundfire, but were soon returned to their unit.

The final regular XII ASC missions of the day were flown by the 31st FG at 1625hr and 1645hr, the former being a P-39 escort and the latter covering ground forces near Sidi Bou Zid. Neither group encountered German aircraft, all involved returning to base unscathed.

While all of this action was going on, hundreds of American troops remained stranded on Djebels Lessouda, Ksaïra and Garet Hadid. A dangerous XII ASC mission was requested in the evening, and the 81st FG received an order to provide two pilots and aircraft. Lieutenant-Colonel Richard P. Klocko asked for a pilot to accompany him, and Lt Frankie Scariano of the 91st FS/81st FG immediately volunteered. Two messages from Gen Orlando Ward of the 1st Armored Division were typed and placed in bags, and the pilots took off and flew directly to Lessouda in the fading daylight. Before reaching the mountain, Lt Scariano's aircraft was hit in the port wing by anti-aircraft fire, but the message was dropped successfully to Lt-Col John K. Waters.

Klocko made it home in near-darkness, but Scariano's P-39 was hit again near Djebel Lessouda, and he turned for home, soon becoming



AUSBORN VIA VINCENT

**ABOVE** Captain James A. Isbell Jr of the 309th FS flew four missions in his Spitfire VB during the air fighting over the battlefield at Sidi Bou Zid on February 15. Isbell was awarded the DFC the following month.

lost before being hit yet again. He made a forced landing but managed to strike an obstacle in the process, cartwheeling his aircraft. Somehow he was unhurt, and set out for home, walking many miles. After dawn the next day he came across friendly troops, and eventually made it back to Thelepte. Importantly, the message was received and understood on Djebel Lessouda, and helped ensure that hundreds of American troops on the mountain were able to break out and reach Allied lines during the night.

Thus ended the second day of the battle at Sidi Bou Zid. The true results of the day's land fighting took some time to filter through to the American commanders, but it was clear that it had been another disaster. The 10. and 21. Panzer-Divisionen had halted the American counter-attack short of its objectives, at great cost in men and materiel. The 2nd Battalion, 1st Armored Regiment, reported 15 officers and 298 enlisted men missing. In two days the 1st Armored Division had lost 98 tanks, 59 half-tracks and 29 artillery pieces. The Allies realised that withdrawal would now be necessary, and that they were unable to hold their forward positions in central Tunisia. This meant giving up Thelepte airfield and valuable defensive locales, and the Kasserine Pass was to be organised for defence.

In the air, the Luftwaffe had been a little less active on February 15 than the previous day, but the Stukas were very effective when plentiful



## SORTIES TO THE SIDI BOU ZID BATTLE AREA, FEBRUARY 15, 1943

BOTH SETS OF figures below include aircraft lost or damaged by bombing and/or strafing. Only *Fliegerkorps Tunis* missions related to *Unternehmen Frühlingwind*, as the German operations at Sidi Bou Zid were designated, are included

	Aircraft			Personnel		
	Sorties	Lost	Damaged	Killed	PoW	Wounded
USAAF XII ASC	202	3	12	1	—	1
Fliegerkorps Tunis	146+	9	11	—	1	1

targets presented themselves in the afternoon. The XII Bomber Command raid on Kairouan was more effective than the Allies could possibly have hoped, not only destroying and damaging numerous German aircraft, but also preventing III./SKG 10 operations from there on this day and the next. The *Stabsschwarm* (HQ Flight) of JG 53 also left Kairouan for northern Tunisia in the wake of the bombing raid.

For its part, XII ASC had fought hard on the second day of the enemy offensive, with the 31st FG particularly active, but had failed to influence events on the ground. However, the American efforts were at least noticed by the Germans, who reported that “enemy air activity became more lively” on the 15th. Personnel of the Allied air units were growing wary because of the 1st Armored Division defeats, and French Curtiss P-40 unit *Groupe de Chasse II/5* wrote in its war diary that it began to make preparations for a withdrawal from Thelepte, with the military situation “causing increasing concern”. An RAF Wing in Algeria noted on this day that it was warned to prepare for “American units evacuating from forward areas”, and one worried 31st FG pilot at Thelepte noted prophetically that “we may lose the field”.

### CONCLUSION

February 14 and 15, 1943, were hectic and eventful days for the men of XII ASC and Fliegerkorps Tunis, as they were called upon to support their

**1** Piecemeal commitment of armoured forces was a feature of US Army operations in Tunisia until April 1943

**2** Although Dow wrote “No 1”, as reported verbatim here, this appears to be a typo and should read “No 2”

**3** Some secondary resources suggest the Stukas knocked out the entire platoon, but this is incorrect

**4** The USAAF used bombing raids on airfields as a way of gaining aerial superiority, providing more effective results than the gradual attrition of aerial combat

respective armies at Sidi Bou Zid. For two days the Axis forces had enjoyed almost total dominance on land and in the skies of central Tunisia, with the bombing of Kairouan their only real setback. For the German army commanders, with Sidi Bou Zid successfully taken and its defenders defeated, several attractive opportunities for exploitation beckoned. The Luftwaffe commanders could reflect on two days where they had done an excellent job of providing effective army support. On the other side, XII ASC had also done its best, but it still had much to learn. Sidi Bou Zid had proven to be a very challenging classroom for the Americans.



**BELOW** The battle at Sidi Bou Zid was a prelude to the Battle of Kasserine Pass, which began four days later on February 19. It was another tactical victory for the Axis forces, although the tide of war began to turn in favour of the Allies again by April 1943.



# BJÖRN'S LITTLE GOBLIN

## The Andreasson BA-4 & BA-4B

Probably best known in the UK as pilot Peter Philips's tiny but highly manoeuvrable mount at airshows during the 1970s and 1980s, the Swedish BA-4/BA-4B sports biplane can trace its roots back to a 1944 design powered by a British motorcycle engine. **JAN FORSGREN** charts the history of Björn Andreasson's "Lilltrollet", still active today

ONE OF SWEDEN'S most interesting sports aircraft is the Andreasson BA-4/BA-4B biplane. Although its ancestry can be traced back more than 75 years, the type is still flying today. Relatively little-known outside the homebuilt and aerobatic aircraft communities, the BA-4B achieved one notable first in being the first Swedish-designed aeroplane to be built under licence in Britain.

### ORIGINS

Swedish designer Björn Andreasson was responsible for a number of light aircraft, most notably the BA-7/Malmö MFI-9 two-seat piston-engined monoplane, also produced under licence in Germany as the Bölkow 208 Junior. Andreasson's first powered aeroplane, however, was the BA-4 sports biplane. Born in 1917, by

**ABOVE** A dapper 27-year-old Björn Andreasson poses beside the BA-4 prototype in 1944. **BELOW** A typically dramatic photograph by the late RICHARD T. RIDING of the BA-4B prototype SE-XBS being put through its paces during its demonstration visit to the UK in July 1967; former RAF pilot Peter Philips was so impressed he bought it.

SWEDISH AVIATION HISTORICAL SOCIETY





**ABOVE** The prototype BA-4 had the registration SE-ANS applied to its fuselage, but it was never officially taken up. Of mainly wooden construction, the extremely lightweight biplane was originally powered by an aero version of the 28 h.p. Scott Flying Squirrel air-cooled engine, built by the British company at its factory in Shipley, Yorkshire.

1944 Andreasson was working as an engineer for the small Swedish aircraft manufacturer AB Flygindustri. Located at Halmstad on Sweden's western coast, the company was producing SG-38 gliders and DFS Weihe sailplanes for *Flygvapnet* (Royal Swedish Air Force) and the Royal Swedish Aero Club. A cargo glider, designated Fi-3 (Flygvapnet designation Lg 105) was also built in limited numbers.

In 1944 Andreasson initiated work on the BA-4 (Björn Andreasson Type 4). Although construction of the small biplane was initially undertaken by Andreasson in his spare time, it was completed by AB Flygindustri. Powered by a 28 h.p. engine from a British Scott Flying Squirrel motorcycle, the minuscule BA-4 was built almost entirely out of wood, weighing a mere 143kg (315lb). The absence of wire rigging meant that the wings could be mounted in 10min. The undercarriage was so designed that in case of a very hard landing, it would detach, thus reducing the risk of the aircraft overturning.

Allocated civil registration SE-ANS (never officially taken up), the BA-4 prototype made its maiden flight on October 10, 1944, at Wing F 14 Halmstad, in the hands of test pilot 2nd Lt Bengt Olow. The latter managed to make only a few flights over the next few days, as during the last test flight a piston failed owing to erratic force-feed lubrication. Olow stated that the flight characteristics of the BA-4 were "quite normal", apart from the aircraft being somewhat underpowered. Frustratingly, flight testing of the BA-4 had to be abandoned, mainly owing to the temperamental Scott engine.

In a contemporary magazine article, Andreasson stated that if he managed to get his hands on a 50 h.p. engine he would immediately remove the troublesome Scott engine, and mentioned the possibility of building BA-4s for private customers. The price would be 7,500–8,000 *Kronor*. As for choosing to build a biplane instead of a monoplane, Andreasson stated that he wanted to keep the dimensions of the airframe down to a minimum.

Following the end of the war, Andreasson secured a job with Danish company *Skandinavisk Aero Industri A/S* (SAI), for which he designed four aircraft, including the KZ VII observation and Army co-operation aircraft and the KZ VIII aerobatic single-seater, both monoplanes. Andreasson brought along the BA-4, which was put into storage at Kastrup. Following his Danish tenure, Andreasson secured employment in the USA, initially with McDonnell and then with Convair in San Diego, with which he worked on control systems.

## THE BA-4 RETURNS TO SWEDEN

While still working for SAI, Andreasson sold the BA-4 prototype in March 1950 to Bertil Johansson, who paid 800 *Kronor* for it. It was collected by Johansson and Egon Alm, who dismantled it and strapped the four wings to the roof of a 1928-vintage Ford Model A, the tailplane and fin occupying the rear seat. Towing the fuselage towards the ferry port caused a few raised eyebrows. Upon the Ford's arrival in Sweden, customs officers were somewhat confused by this odd cargo. However, following



## Andreasson BA-4/BA-4B data

### Powerplant

**BA-4** 1 x 28 h.p. Scott Flying Squirrel four-cylinder two-stroke air-cooled piston engine

**BA-4B** 1 x 100 h.p., Continental O-200A four-cylinder horizontally opposed air-cooled direct-drive piston engine

	BA-4	BA-4B	
<b>Dimensions</b>			<b>(BA-4B) Wings</b> Braced biplane type with a single streamline-section interplane strut each side; constant chord of 0.8m (2ft 7½in); incidence = upper wing 3°, lower wing 4°
Span			
upper wing	5.0m (16ft 5in)	5.34m (17ft 6in)	
lower wing	—	5.14m (16ft 11in)	
Length	4.6m (15ft 1in)	4.6m (15ft 1in)	
Wing area	7.2m² (78ft²)	8.3m² (90ft²)	
<b>Weight</b>			<b>Fuselage</b> Sheet metal structure with external stringers, extensive use of pop-riveting
Max take-off	260kg (573lb)	375kg (827lb)	
<b>Performance</b>			<b>Undercarriage</b> Non-retractable tailwheel type, cantilever spring steel main legs; hydraulic brakes; steerable tailwheel carried on leaf-spring <i>Jane's All The World's Aircraft 1969-70</i>
Max speed	160km/h (99 m.p.h.)	225km/h (140 m.p.h.)	
Stall speed	—	64km/h (40 m.p.h.)	
Climb at sea level	—	600m/min (2,000ft/min)	
Take-off run	—	<100m (<330ft)	
Landing run	—	<100m (<330ft)	
Range	—	280km (175 miles)	

a brief but intense debate, Johansson and Alm were allowed to continue to Lydinge Farm at Simmelsberga, near Helsingborg, where farmer Gunnar Esbjörnsson, owner of Miles Gemini SE-AYM, had given permission for the BA-4 to be assembled and flown.

The performance of the Scott engine could not be improved, and it was replaced with a 40 h.p. engine removed from a Mignet Flying Flea, requiring a redesign of the BA-4's engine mounting. As a result, the BA-4 showed markedly improved performance, receiving the nickname *Lilltrollet* (Little Goblin), although one of the lower wings was damaged during a groundloop shortly afterwards. The damage was repaired, with brakes from a Klemm Kl 35 being fitted, but no further flights took place. The BA-4 disappeared into storage, the fuselage and upper wings eventually emerging at a private museum at Helsingborg. The original Scott engine is held by the Arlanda Civil Aircraft Collection.

### THE IMPROVED BA-4B

Following Andreasson's return to Sweden from the USA in 1960 to join Malmö Flygindustri (MFI), he received a request from members of the newly established Swedish chapter of the USA's Experimental Aircraft Association (EAA) to provide a modernised variant of the basic BA-4. According to a 1965 article in Swedish aviation magazine *Flyghorisont*, Andreasson was "engaged in redesigning the small biplane to a very simplified pop-riveted metal design. For now, the wings will retain their simple wooden construction. The new BA-4, called the BA-4B, can be fitted with engines from the 40 h.p. Stamo Volkswagen to the 100 h.p. Continental O-200. The prototype, already under construction, will fly within a year".

The EAA's Chapter 222, the first to be established outside North America, had three specific requests for the BA-4B:

- the aeroplane shall require a minimum of space during construction;
- its construction should be able to be completed with a minimum of special machinery;
- the aeroplane shall exhibit "good-natured" flight characteristics.

The prototype BA-4B was built at the MFI technical school, and, although it had been intended to retain wooden construction of the wings, they were changed to metal. The engine was a 100 h.p. Continental O-200-A, although a 75 h.p. Continental had originally been considered. The prototype, temporarily registered SE-XBS, made its first flight on July 1, 1966, test pilot Ove Dahlén finding little to complain about, although the undercarriage had to be moved forward 5cm (2in) to increase propeller clearance.

The BA-4B was highly aerobatic and easy to fly and maintain. Its closest contemporary equivalent was probably the USA's Pitts S-1, also available to homebuilders around the world. MFI intended to produce kits of the BA-4B, if sufficient interest in the aeroplane was shown by prospective customers, for 5,000 Kronor excluding engine, wheels and instruments. In the event, no prefabricated kits emerged, although a set of detailed drawings was produced. Apart from the necessary plans and detailed description, this package also included the licence fee for one aeroplane. The price for such a package was 400 Kronor.

The BA-4B prototype was officially registered SE-XBS in July 1967, a necessary step owing to prospective demonstration flights in the UK. By this time, the original engine cowling had



**ABOVE** The prototype BA-4B, SE-XBS, is prepared for a flight circa 1966–67. In contrast to the all-wood BA-4 prototype, the BA-4B was of all-metal construction, although the design provided for alternative all-wooden wings too. The stagger was 20° with the upper wing set with dihedral of 2° and the lower wing of 4°. The prototype was fitted with a Continental O-200A engine, as seen here in its original cowlings.



**LEFT** A rare photograph of BA-4Bs SE-XCA (c/n 2) and 'XCC (c/n 3) together, at Gävle in eastern central Sweden in September 1973. Note the improved engine cowlings providing the aircraft with much more attractive proportions. One example of a two-seat tandem version of the BA-4B, the BA-11, was built; it remains active.

LEIF FREDIN VIA AUTHOR

been replaced with that fitted to the MFI-9, while the upper wing had been redesigned to accommodate ailerons, which increased the BA-4B's roll rate from 120°/sec to 200°/sec. Swedish interest in the BA-4B is illustrated by the fact that, of the six permits-to-build issued by EAA Chapter 222 in 1967, three were for BA-4Bs. However, only two of these were completed, as SE-XCA and 'XCC. The construction of two BA-4Bs was started by STIL Industrier at Vårgårda, for which the registrations SE-XCD and 'XCE were reserved, but both were sold to Crosby Aviation in the UK before completion. One further BA-4B was built in Sweden, and registered SE-XLR. Of the Swedish-registered BA-4Bs, SE-XCA became a well-known participant at airshows around the

country, regularly incorporating manoeuvres such as inverted flat spins and Lomcováks. Built and flown by Tage Simonsson, SE-XCA was progressively modified, a succession of more powerful engines being installed, as well as the replacement of the oblique wing strut with flying wires. During the 2010s SE-XCA was briefly displayed at Svedinos Aviation Museum at Ugglarp, but has since returned to the air.

An enlarged variant of the basic BA-4B, known as the BA-11, was also built. Only one was produced, SE-XCK, which is still airworthy.

### BRITISH INTEREST

The British demonstration flights of SE-XBS took place at Elstree in July 1967, and particularly impressed by the small Swedish biplane was

*In its vivid red-and-white colour scheme, BA-4B SE-XCA became a regular sight at airshows around Sweden and is seen here performing a typically vigorous aerobatic routine with smoke.*

SVEN STRIDSBERG VIA AUTHOR



ARLANDA CIVIL AVIATION COLLECTION



ANTICLOCKWISE FROM LEFT BA-4B SE-XCC at the EAA Fly-in at Barkarby in June 1995; Peter Philips in G-AWPZ (formerly SE-XBS) at a show in the UK in July 1970; the all-yellow G-BEBS in July 1988; G-BIEX in August 1982 — it was written off in a landing accident when it hit trees at Snape Mires in April 1984; G-AYFV while being operated by Nick Houghton, seen here at the Popular Flying Association Rally at Cranfield in July 1986.



MIKE HOOKS X4





## Andreasson BA-4/BA-4B production data



Registration	C/n	First flight	Date reg'd	Remarks
(SE-ANS)*	—	10.10.44	—	Sole BA-4 prototype
SE-XBS	1	1.7.66	7.67	BA-4B prototype. To G-AWPZ, 24.9.68
SE-XCA	2	—	26.11.68	—
SE-XCC	3	—	—	—
(SE-XCD)	4	—	—	Not completed, sold to Crosby Aviation
(SE-XCE)	5	—	—	Not completed, sold to Crosby Aviation
SE-XLR		18.8.91	—	—
G-AYFU	001/PFA/1358	—	26.6.70	Written off (w/o) at Parham, Sussex, UK, 3.6.78
G-AYFV	002/PFA/1359	—	26.6.70	—
G-AYFW	003	—	26.6.70	W/o near Chateauroux, France, 28.7.78
G-BEBS	PFA 038-10157	—	7.7.76	—
G-BEBT	PFA 038-10158	—	—	—
G-BFXF	PFA 038-10351	11.9.2001	—	—
G-BIEX	PFA 038-10508	—	2.1.81	Crashed at Snape Mires, Yorkshire, UK, 20.4.84. Canx 13.3.89; parts to G-YPSY
G-YPSY	PFA 038-10352	—	7.6.78	Overturned at Bagby, North Yorkshire, 31.8.93

\* brackets = not officially taken up

former RAF pilot Peter Philips, who purchased SE-XBS (which became G-AWPZ on the British register) and secured manufacturing rights for the aircraft. As a result, the BA-4B was put into limited production by Crosby Aviation Ltd, owned by Philips and John Crosby, based at Knutsford, near Manchester.

An initial series of three BA-4Bs was laid down, being registered as G-AYFU, 'YFV and 'YFW respectively. Of these, 'YFV differed in being powered by a 160 h.p. Lycoming IO-320-B1A. A comprehensive set of drawings for the BA-4B was also available from Crosby Aviation.

In 1974 a pair of uncompleted BA-4Bs was purchased from Sweden. The wings from one of these was used to repair 'YFW following a mishap. Soon afterwards, two BA-4Bs were

constructed by Hornet Aviation of Brighton, being registered as G-BEBS and 'EBT. Since then, three further BA-4Bs have been built by Popular Flying Association (PFA) members — G-BFXF, G-BIEX and G-YPSY. The BA-4B remains popular with its owners with several still flying. The prototype, SE-XBS/G-AWPZ, remains active at Goodwood in Sussex.

Although the BA-4/BA-4B could not be considered a resounding success, it was an interesting aeroplane, highly rated by the pilots who flew it.



**ACKNOWLEDGMENTS** The Editor would like to thank Philip Whiteman, Editor of Pilot magazine ([www.pilotweb.aero](http://www.pilotweb.aero)) and Peter R. March for their assistance with the preparation of this article

**BELOW** Peter Philips undertakes a characteristically lively display in BA-4B G-AWPZ at an airshow in the 1970s. Now more than 50 years old, this historically significant and still-airworthy aircraft is based at Goodwood airfield in Sussex, from where it still flies regularly in essentially the same colour scheme it has worn throughout its life.

MIKE HOOKS



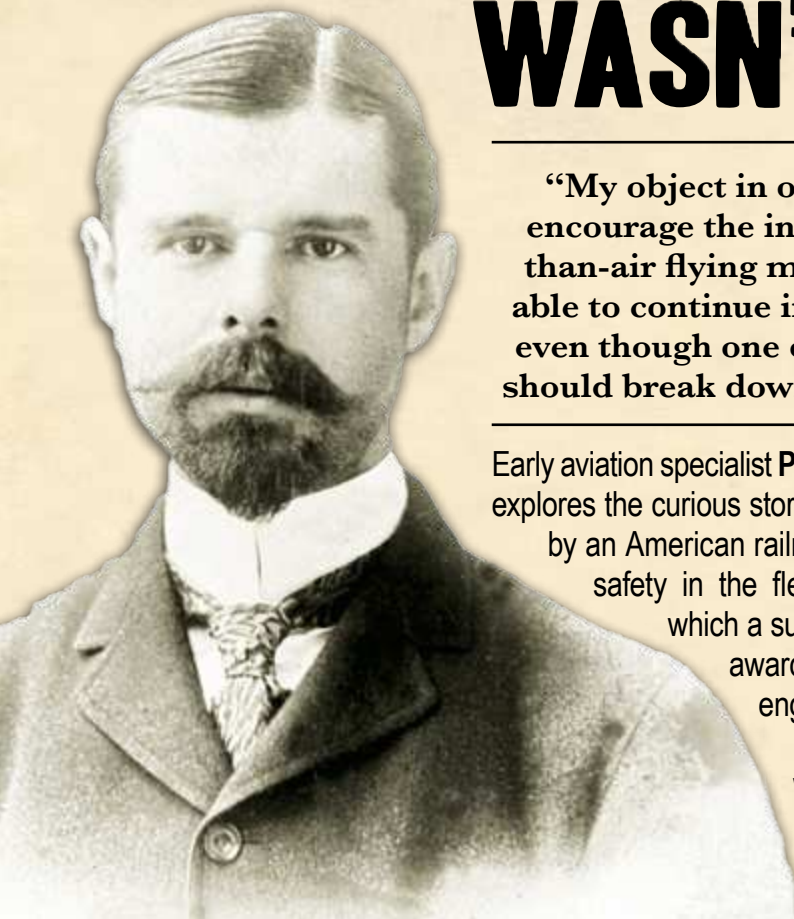


THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL AND OTHER IMPROVEMENTS

June 11, 1910

# HOW THE GOULD PRIZE WASN'T WON

**RAILROAD BOSS OFFERS  
\$15,000 PRIZE FOR AIRPLANE!**



**“My object in offering the prize is to encourage the invention of a heavier-than-air flying machine which will be able to continue in safety on its course, even though one of the driving devices should break down . . .” — *Edwin Gould***

Early aviation specialist **PHILIP JARRETT** Hon CRAeS explores the curious story of a competition established by an American railroad scion in 1910 to promote safety in the fledging field of aviation — in which a substantial cash prize was to be awarded for a “fail-safe” multiple-engined manned flying-machine. Ultimately, however, the prize was never awarded. Why not?

IN ITS ISSUE for June 11, 1910, *Scientific American* magazine announced that Mr Edwin Gould, the son of railroad magnate Jay Gould, and President of the St Louis Southwestern Railway Company of New York, USA, described as a "patron of aviation science", was offering a substantial money prize to the successful designer and demonstrator of a safe multiple-engined heavier-than-air aeroplane. In his letter to the magazine's editor, dated June 2, 1910, Gould stated:

"In order to promote progress in aviation, I offer through the *Scientific American* a prize of \$15,000, which is to be given to the inventor who designs and demonstrates in this country the best heavier-than-air flying machine equipped with more than one propeller and with more than one independent motor, in such manner that the motors can be operated together or independently. My object in offering the prize is to encourage the invention of a heavier-than-air flying machine which will be able to continue in safety on its course, even though one of the driving devices should break down. In order that the efficiency of the inventions may be thoroughly tested, it will be necessary to subject them to endurance tests of stipulated length of time or distance. Full conditions governing the award of the prize will be announced in a later issue of the *Scientific American*."

"It is Mr Gould's primary intention," the magazine stated, "to further aeronautic invention, and with that end in view he offers a prize, not for the fastest flying-machine, but for a type of flying-machine which has thus far not been constructed. Absolute safety must certainly be attained before a flying-machine can ever become even a popular vehicle of pleasure, and the attainment of safety is the chief object which Mr Gould has in view".

## THE RULES

The rules governing the competition were published in the magazine's issues for September 17 and December 10, 1910. In part, they specified that the aircraft, which could be "aeroplanes, helicopters, ornithopters, etc", were to have "two or more complete powerplants (separate motors and propellers), so connected that any powerplant may be operated independently, or that they may be used together". Complete drawings and specifications of the machines, with all mechanisms clearly shown, were to be filed with the Contest Committee, consisting of a representative of

*Scientific American*, the Aero Club of America and "some technical institute".

Before a demonstration flight was made, it had to be shown that the entrant was "able to drive each engine and propeller independently of the other or others", and that it was possible to "couple up all engines and propellers and drive them in unison". The prize was not to be awarded "unless the competitor can demonstrate that he is able to drive his machine in a continuous flight over a designated course; and for a period of at least one hour he must run with one of his powerplants disconnected; also he must drive his engines during said flight alternately and together". The issues of stability, ease of control and safety were also to be taken into consideration.

Entries were to be received at the magazine's offices on or before June 1, 1911, and the contests were set to take place on July 4 and the following days "under reasonable conditions of weather". It was specified that "at least two machines must be entered in the contest or the prize will not be awarded". In its issue of July 16, 1910, *Scientific American* had reported that the announcement of the prize had elicited "a flood of correspondence to this office, some of it solicited, the rest voluntary", the Editor having sought the written opinion of those having technical knowledge and experience. Approving respondents who submitted suggestions and comments included Charles Manly, who had been involved with the engine for Professor Samuel Langley's "Aerodrome" of 1903 [see Nick Engler's *Politically Incorrect in TAH11 — Ed.*]; A. Lawrence Rotch of the Blue Hill Meteorological Observatory; Glenn Curtiss; Wilbur Wright; 1st Lt Frank Lahm, an early military pilot, and A.F. Zahm, Secretary of the Aero Club of Washington DC.

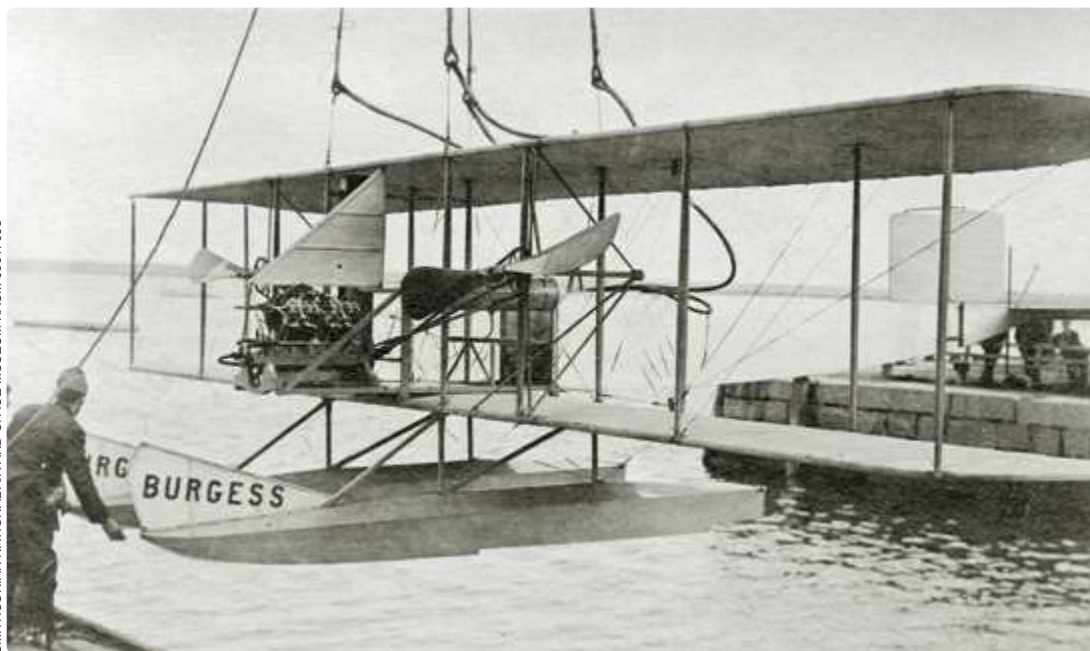
Despite this promising start and the handsome sum being offered (equivalent to more than \$400,000 in 2020), things then went very quiet. Gould's offer was announced again in the American magazine *Aircraft* in its February 1911 issue. Progress was still very slow, and the closing date for entries was postponed for a year, to June 1, 1912, with the fly-off to begin on July 4, "on some aviation field in the vicinity of New York", as *Aeronautics* (USA) reported in its July 1912 issue. Both the latter and *Aircraft* listed the following 11 entries in their July 1912 issues:

■ Alleas Aeroplane Company of Boston, Massachusetts: a "double biplane of the following-surface type";

■ Howard Gill of Boston: a biplane;

**OPPOSITE PAGE** Edwin Gould was born in Manhattan to railroad financier Jay Gould on February 26, 1866; after studying at Columbia University, he followed his father into the railroad business. It appears that the Gould Prize was his only venture into aviation, and, after a career as a successful railroad magnate, he died in 1933, aged 67.





**ABOVE** The Burgess-Gill machine at an early stage of development. It has only the Hall-Scott engine installed and driving a pair of tractor propellers; small triangular fins on the float noses, and a triangular fin projecting forward from beneath the centre of the upper wing. The rear fuselage is covered, and there are no underfins at the tail.

- H. Curtis of Manchester, Massachusetts: Burgess biplane;
- The Boland Aeroplane & Motor Company of Rahway, New Jersey: a biplane;
- Edward J. Elsas of Kansas City, Missouri: a biplane;
- H.W. Mattoni of 217 West 120th Street, New York: a multiplane;
- Macleod Multiplane Company, Richmond, Staten Island, New York: a multiplane;
- Charles H. Burleigh of South Brunswick, Maine: a multiplane;
- George W. Beatty of Mineola, Long Island: a biplane;
- Grover Cleveland Loening on behalf of the Queen Monoplane Company of Fort George, New York: a monoplane;
- John P. Conkling of 125 East 23rd Street, New York City: a biplane.

There were really only ten entries, as Gill and Curtis were both involved in the same entry, the "Burgess-Gill Twin Engine Aquaplane", built by the Burgess Co & Curtis and Gill. Howard W. Gill, who had flown both Curtiss and Wright aircraft and was the current holder of the American duration record, had been awarded Aero Club of America Pilot's Licence No 31 on July 12, 1911. He both designed and financed the aircraft intended for the Gould competition.

It was a curious beast. A biplane with 39ft (11.89m)-span Burgess-Wright Model F wing panels, it had a wooden wire-braced box-girder fuselage carrying twin all-moving rudders and a warping elevator at its aft extremity. Each

rudder post was mounted on two bearings in the fuselage, and one rudder could still operate if the other was put out of action. Lateral control was by wing-warping, and the chain that ran round the pulley and joined the warping cables was supplemented by a wire that would maintain the linkage if the chain broke. The claim was made that "all parts that have ever been known to break are in duplicate".

The two engines were to be mounted in tandem in the nose, well ahead of the cockpit, which was located well aft of the wings. The front engine and main powerplant was a 60 h.p. eight-cylinder Hall-Scott, which drove two flanking 6ft (1.8m)-diameter counter-rotating tractor propellers in front of the wings via sprockets and chains. The auxiliary rear engine, a standard 30 h.p. four-cylinder Wright, drove a pair of flanking 6ft-diameter counter-rotating pusher propellers mounted behind the wing trailing edges, directly in line with the forward pair. The Wright engine was speeded up to more than 1,500 r.p.m. by making the gearing 10 to 34 instead of the usual 11 to 34.

To connect the two motors together, the ends of their crankshafts were extended. A "small-diameter leather-faced cone clutch" on the rear engine's shaft extension was used to connect the two engines together when they were to be driven in unison, or as a means of starting either engine. It could be operated from the pilot's seat, and could be locked in place when the two engines were run together. The two powerplants were "separate and distinct, in every detail",



PHILIP JARRETT COLLECTION

**ABOVE** Howard W. Gill, designer and pilot, was killed in a mid-air collision while flying a Wright single-seater at Cicero Field in Chicago on September 14, 1912.

having their own radiators and fuel tanks. The aircraft could be mounted on a wheel-and-skid undercarriage or on long twin (Frank T.) Coffyn floats carrying twin vertical surfaces on their front ends.

As the aircraft would have to be capable of flight on one engine, it first appeared with only the Hall-Scott engine driving one pair of tractor propellers. Initially, the fuselage was fabric-covered. Gill made the first flights of the machine, fitted as a floatplane, in New York in May 1912, at the first American hydroplane meeting; and then at Marblehead, Massachusetts, during May and June. While the aircraft was under repair following an accident in May, Gill decided that it might be more

controllable with the fuselage uncovered, and at the same time it was fitted with additional under-rudders and new and larger vertical fins on the floats (two different types of fins had already been tried).

Gill first flew the aircraft in its modified form on May 23, 1912. The second (Wright) engine driving the two pusher propellers was then installed. During the June trials at Marblehead the biplane was overturned by a gust of wind as Gill was skimming across a bay of Peaches Point. He clung to the aircraft until he was rescued; but it was only a minor mishap, and the machine's ability to fly on either engine had been proved.

### THE QUEEN'S GNOME SANDWICH

It seems that the only other entry to be completed was the twin-engined Queen monoplane, entered on the company's behalf by Grover Loening. Queen built rotary-engined Blériot-type monoplanes, and the company's attempt to adapt this configuration to twin engines was somewhat less than elegant.

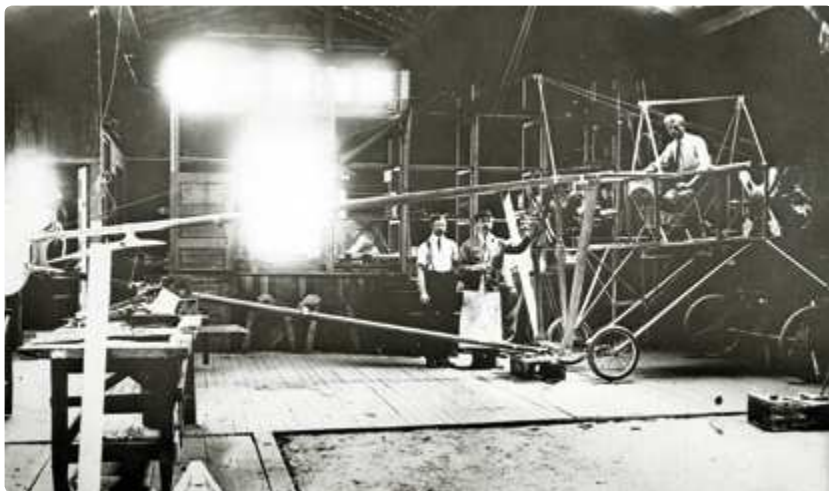
While the forward fuselage, wings and main undercarriage retained their Blériot features, the fuselage was cut off at the wing trailing edge, where the second rotary engine was installed as a pusher, the pilot thus forming the "filling" in a "Gnome sandwich". Both engines drove two-bladed propellers. The tail surfaces, comprising a small circular rudder and a tailplane with tip elevators, were carried on a decidedly precarious-looking triangulation of three wire-braced booms attached by complex strutter to the fuselage and to the mounting struts for an additional pair of wheels that served to keep the rear propeller clear of the ground. A cumbersome machine, it must have given Queen some headaches, but information regarding its tests are lacking.

Unfortunately for Gill and the Burgess

**BELOW** Howard Gill piloting the "Burgess-Gill Twin Engine Aquaplane" at Marblehead, Massachusetts, circa May-June 1912. The aft position of the pilot is well shown here, as are the larger float-mounted fins. By this time the rear fuselage had been uncovered, Gill having decided that the aircraft was more controllable with less side area.

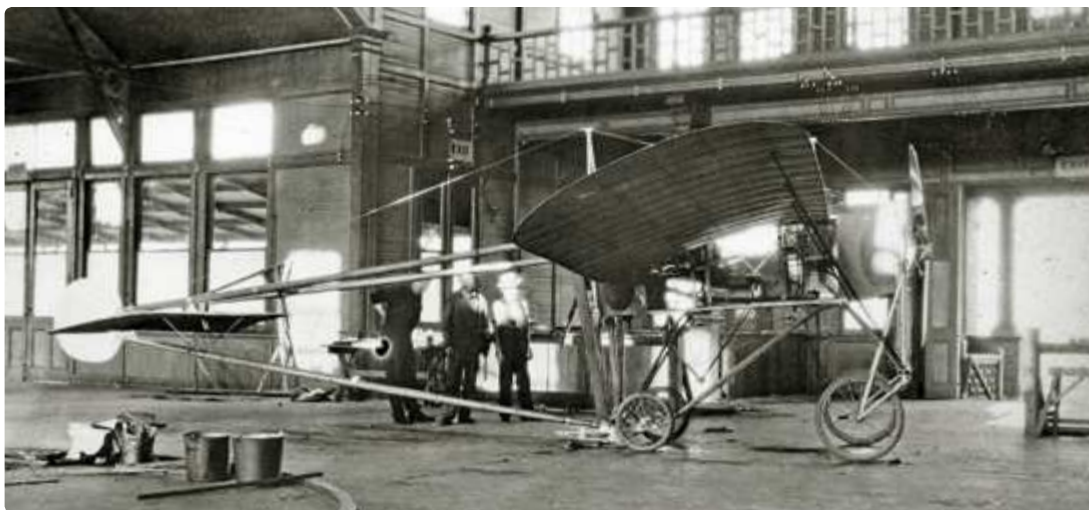
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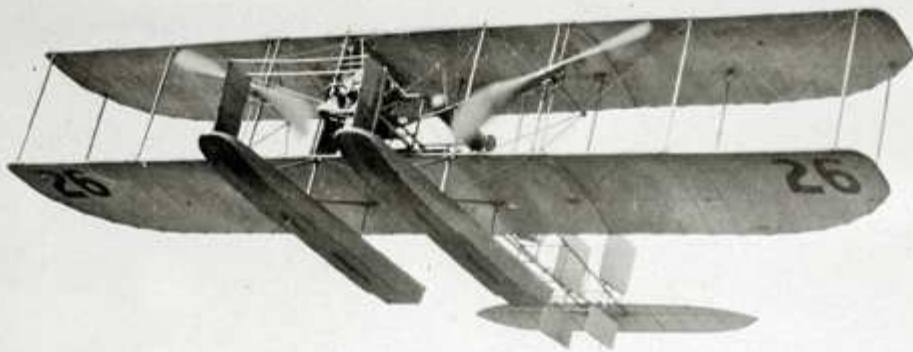
**LEFT** The ungainly twin-engined Queen monoplane under construction in one of the Queen Aeroplane Company's buildings at the (then defunct) Fort George Amusement Park in Upper Manhattan, New York City, circa mid-1911. The man in the fuselage is facing rearwards.

**BELOW** A three-quarter-rear view of the Queen twin monoplane in the company's factory shortly after its completion in 1912.



**ABOVE** A starboard side view of the Queen monoplane at the former Fort George Amusement Park, showing the somewhat fragile nature of its design and construction, including a cumbersome undercarriage arrangement and the rather inadequate-looking tail booms. Unsurprisingly, it was withdrawn from the Gould Prize competition.





company, things did not work out as anticipated. Alarming, all of the other entries, including the Queen monoplane, failed to materialise, their creators having withdrawn from the contest. In retrospect this was no great surprise, as such competitions always attracted a good number of self-deluding eccentric inventors with impractical creations that had little or no chance of success. However, the Burgess team had built its aeroplane in the belief that, even if only two entries were completed, the contest would be held and an award was certain. The aircraft was completed and flown a month before the deadline, but when Gill made his formal entry on June 1, 1912, he was informed by *Scientific American* that it interpreted its rules to mean that two "operative" machines must actually be on the appointed field on July 4 in order for the award to be made. Unfortunately there was no likelihood of there even being another machine on the field, let alone airworthy.

In its July 13, 1912, issue, *Aero & Hydro* published the following announcement dated "New York, July 4" and headlined "Edwin Gould Prize not Awarded":

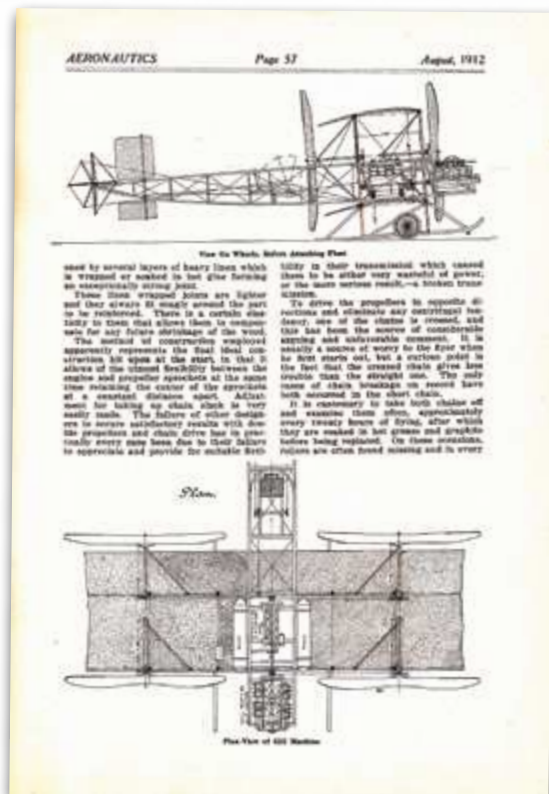
"At the Hempstead Plains aviation field yesterday the judges appointed to decide upon the award of the Edwin Gould prize of \$15,000 . . . formally declared there was no contest. Under the terms of Gould's offer, the time of which was extended, the prize may be withdrawn by the donor. Eleven machines were entered for the event, but ten retired several days ago, it is stated. This left none to contest with Howard W. Gill of Baltimore, as required by the conditions, it was argued."

In the editorial in its August 1912 issue, *Aeronautics* pointed out:

"This condition nullified the possibility of any one successful builder's going into the contest independently of another. The winning of the prize, therefore depended not on the builder's own efforts but on those of some

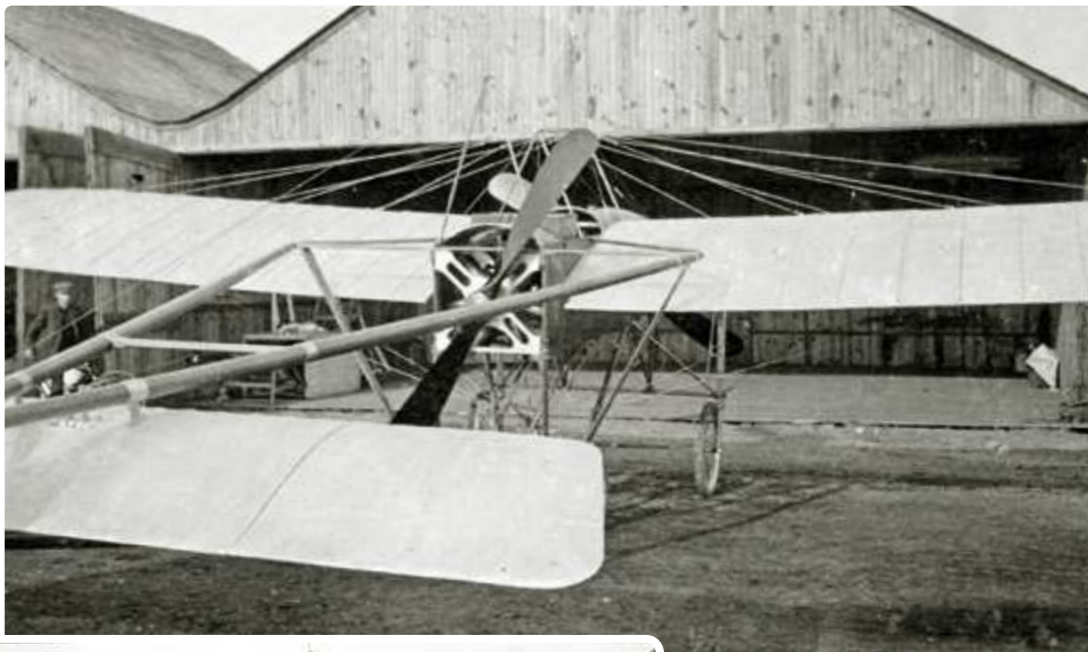
**ABOVE** An underside view of the Burgess-Gill aeroplane in flight, showing the long two-stepped floats. The significance of the number "26" under the wingtips of the bottom planes is unknown; as the wings were taken from a conventional Burgess-Wright Model F biplane they were possibly already so marked.

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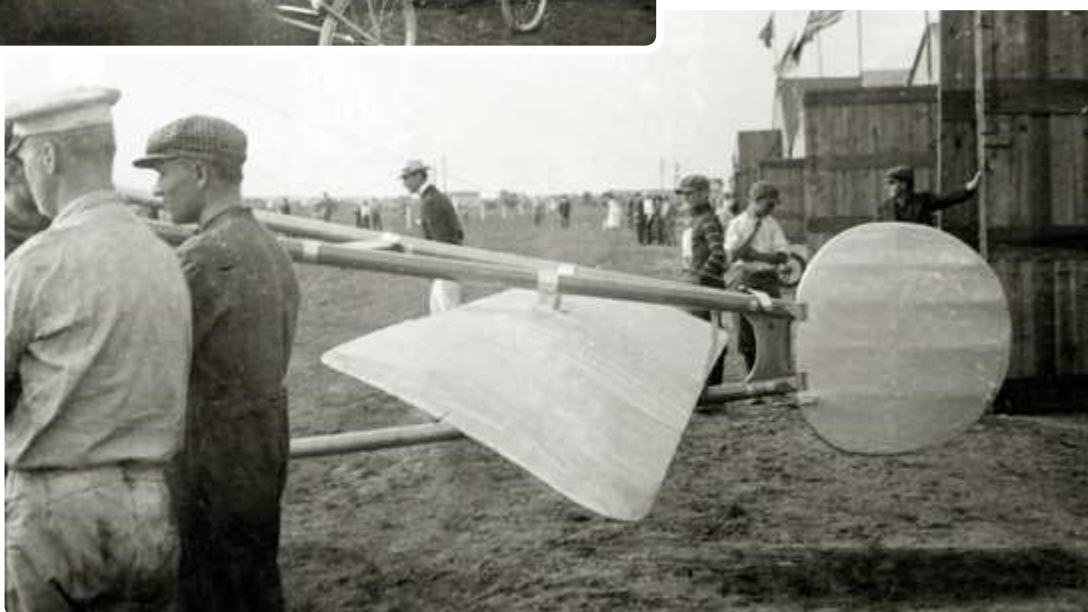
PHILIP JARRETT COLLECTION

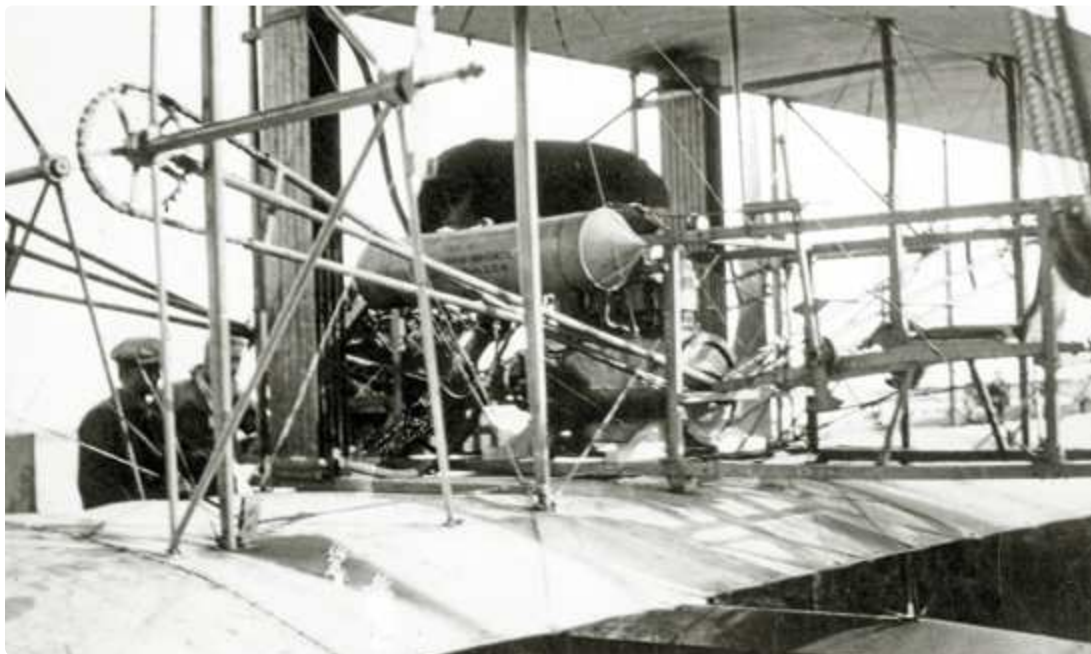
**ABOVE** The August 1912 issue of *Aeronautics* included a short article on the Burgess-Gill machine, which included a side elevation of it in landplane form, and a plan view of the forward fuselage and wing centre-section, showing the powerplant installation and cockpit. Interestingly, Gould's prize money had already been withdrawn by the time it was published.



**THIS PAGE** Various views of the Queen twin-engined monoplane outside the hangars at the Nassau Boulevard Airfield on Long Island, New York, possibly during the Aero Meet of late September 1911, sponsored by the Aero Club of America (although it does not seem to have been flown at that event). The Queen Aeroplane Co occupied hangar No 14 at this airfield. The rear engine and tailboom arrangement are seen to good effect ABOVE, while the rather unwieldy undercarriage and front engine installation are the focus of the photograph at LEFT. The tail surfaces, comprising a primitive elevator and rudder, may be seen BELOW.

LEFT: NASM 94-7036





**ABOVE** A rear-view close-up of the powerplant installation in the Burgess-Gill, showing the Wright engine driving the pusher propellers and the Hall-Scott driving the tractor propellers via chains. Aeronautics explained that "to drive the propellers in opposite directions and eliminate any centrifugal tendency, one of the chains is crossed".

other contestant. Had Mr Gill known of this interpretation before starting to build, this 'freak' machine would never have been produced."

The editorial continued:

"Eleven people formally made entry and furnished drawings and descriptions to the best of their ability, of the machines they hoped to build. That only one man did build and fly a machine which fulfilled the operating conditions makes no less a contest. He did produce the 'most practicable' machine — the only one that was proven practical. Not only has Gill lost his prize through the failure of others but has lost it just so completely through misinterpretation of the published rules. Discussion from all sides has produced the statement 'the prize was never intended to be awarded'."

Although Gill endeavoured to persuade the *Scientific American* committee to award him a sum to recompense him for his work and expense, he was unsuccessful. Orville Wright subsequently said that he thought the rules "most ridiculous and very unfair", and told Gill that he felt indignant at the way he was treated.

On the other hand, in its detailed description of the aircraft, *Aeronautics* reported that: "The apparatus was awkward to handle and proved to Gill's satisfaction the uselessness of such a contraption as a practical machine", especially as it carried no passengers. It was also stated that the Gould prize had proved to be a "will-o'-the-wisp". However, the rules had clearly decreed that "at least two machines must be entered in the contest or the prize will not be awarded",

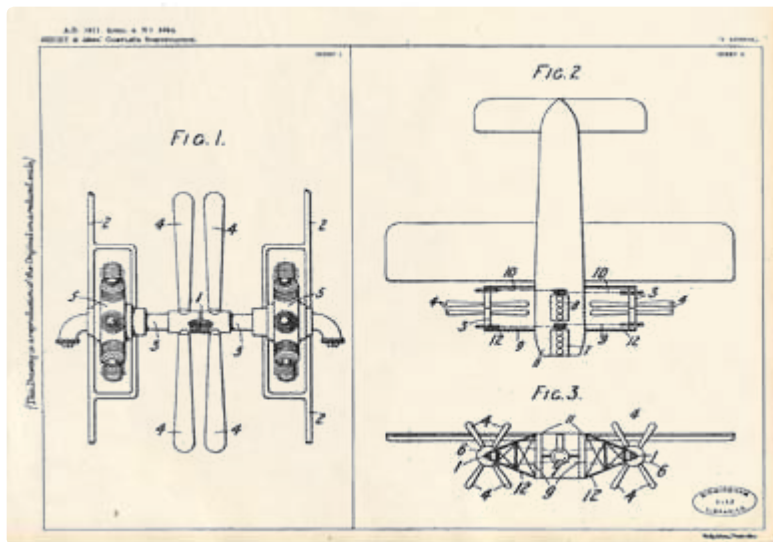
and there had been no contest as such. Gill and the Burgess company had wasted a lot of money, time and effort on an aircraft that had no commercial value. Consequently the Burgess-Gill Gould prize aircraft was not developed, and it was probably broken up for spares.

### ENGLISH INTEREST?

It seems possible that, back in early 1911, across the Atlantic in England, the three Short brothers, Horace, Eustace and Oswald, might also have been eyeing the Gould prize. On April 4 that year they applied jointly for a patent covering a "means for propelling flying-machines and other aerial apparatus in which two or more screw propellers are employed which are driven separately by two or more internal combustion engines or other independent powerplants". Diagrams show alternative systems, such as a pair of Gnome rotary engines mounted face-to-face with a pair of propellers in between them, and a design for a monoplane or biplane having a pair of inline engines installed in tandem in the nose, each one driving a pair of propellers carried on outriggers extending from the fuselage on either side via chains and sprockets. The patent, No 8394 of 1911, was accepted on February 1, 1912. The coincidence of these dates with the Gould prize dates is hard to ignore.

The Shorts' patent agent was Griffith Brewer, who was also the Wrights' patent agent in the UK. He had established a successful relationship between the Shorts and the Wright brothers in the USA in 1909, when the Wrights





**LEFT** The diagrams from Short Brothers patent No 8394 of 1911. Figure 1 shows the twin-Gnome rotary-engine installation, and Figures 2 and 3 an installation with twin inline engines mounted in the nose driving four propellers carried on outriggers.

PHILIP JARRETT COLLECTION

**BELOW** The Radley-England Waterplane of 1913 was a four-bay biplane initially powered by three Gnome rotary engines in tandem driving a single large four-bladed propeller. The pilot and passengers were accommodated in the twin hulls. The aircraft made its first flight in 1913.

subcontracted the Short brothers to build six Wright Flyers. It is not inconceivable, therefore, that the Shorts might have been considering entering for the Gould prize via the Wrights or Burgess-Wright. However, any such entry would probably have been refused, as the first clause of the rules specifically required that the machines be “designed and demonstrated in this country” (i.e. the USA). Although the company did not build any machines based on the patented ideas, it subsequently constructed two aircraft powered by twin rotary engines for Frank McClean in 1911 — the S.39 “Triple Twin” and S.27 “Tandem Twin” — but both lacked the necessary powerplant connections that would have enabled them to meet the Gould requirements.

In 1913 in Britain, another aeroplane appeared

that might have met the Gould requirements with modification. This was the twin-hulled Radley-England Waterplane, which had three independently-controllable 50 h.p. Gnomes in tandem on a common crankshaft, but it had only one propeller. One of its creators, the Blériot pilot James Radley, had made a successful tour of the USA in 1910, and it could well be that he initially conceived the Waterplane after learning of the Gould prize requirements. However, the aircraft materialised too late, and would surely not have qualified for entry.



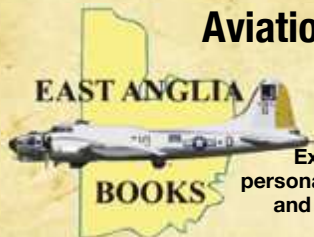
**ACKNOWLEDGMENTS** The author and Editor would like to thank Carroll Gray, Melissa Keiser, Kate Iggoe and the Chair of the Archives at the Smithsonian National Air & Space Museum for their help with this article



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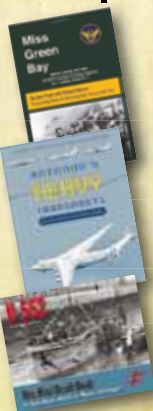
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MAJOR SU SAMPONG:

# ON THE WINGS OF THE HANSA



## Flying with the *Aviation Royal Khmère*, 1960–75 / Part 1

**ALBERT GRANDOLINI** opens a new series chronicling the varied 15-year military flying career of the late Major Su Sampong, a Cambodian pilot who served with the *Aviation Royal Khmère* during the nation's most turbulent period — in which its air arm was frequently caught in the crossfire of the ever-escalating war in neighbouring Vietnam



**T**HE AIR WAR in Cambodia during 1970–75 has been little-covered in most accounts of the air operations of the broader Vietnam War, despite being a significant part of the conflict. One explanation may be that the ensuing genocide undertaken by the Khmer Rouge engendered little appetite in the West to trace the reasons and responsibilities that led to that tragedy. Indeed, the “Little Kingdom” initially did its utmost not to become embroiled in the neighbouring conflict. However, the ambiguous policy pursued by Cambodia’s ruler, Prince Norodom Sihanouk, would ultimately doom the nation and its people. This article aims to present the events of this turbulent period through the experiences of a Cambodian military pilot, the late Major Su Sampong, who died in Paris on May 17, 2020, and whose own story parallels the tormented destiny of his homeland.

### BIRTH OF AN AVIATOR

Su Sampong (seen **LEFT** in the cockpit of a Fouga CM.170 Magister in the late 1960s) was born on December 4, 1940, in Battambang in north-western Cambodia, where his father was the Governor of the Province of the same name and a relative of the royal family that ruled the country on behalf of the French Protectorate. Su Sampong moved to the capital, Phnom Penh, when his father died prematurely, to live with his grandfather. Su Sampong recalled being fascinated by the Japanese aircraft operating from the local Pochentong airfield at the end of the Second



**A French instructor pilot climbs aboard an AVRK Morane-Saulnier MS.733 Alcyon for a training sortie. The Alcyon (Kingfisher) made its maiden flight in 1949, and a batch of 19 was acquired by the AVRK in the 1950s. France despatched around 30 military instructors to Cambodia until March 1970.**

SO SATTO VIA AUTHOR



World War, leading to a deep interest in aviation.

In 1949 Su Sampong moved with his family to France, where his grandfather settled, choosing to be away from the political struggle between royalists and republicans over the independence of the home country. Prince Sihanouk eventually prevailed and declared Cambodia's independence from France in November 1953. Su Sampong continued his studies in Paris until 1959, when the family decided to return to Cambodia. While aboard the Air France Lockheed Constellation on the way home, a clearly inspired Su Sampong expressed his intention to become a pilot — very much against the wishes of his family, who had plans for him to become a doctor. He finished his studies at the prestigious René Descartes College in Phnom Penh before taking the entry examination for the Air Academy of the *Aviation Royale Khmère* (AVRK).

Following the conclusion of the First Indochina War in 1954, Cambodia had regained full sovereignty and was determined to retain strict neutrality in the developing Cold War, declining the USA's offer to join the South-east Asia Treaty

Organisation (SEATO), which grouped Australia, France, New Zealand, Pakistan, the Philippines, UK, USA and Thailand into an "Asian Nato", although this alliance never became an integrated military command. Strong links were retained with France, however, with the latter's President de Gaulle supporting Cambodia in its neutral stance. By the 1960s Cambodia was experiencing some of the strongest economic development in the so-called "Third World".

## DEVELOPING THE AVRK

In the wake of the Indochina War, Cambodian armed forces began evolving from former French colonial units and benefited from the support of advisers of a French Military Mission. The AVRK was created in 1954 with some Morane-Saulnier MS.500 observation aircraft (French-built Argus-engined Fieseler Fi 156 Storchs), MS.733 Alcyon trainers, Douglas C-47 transports and seven Fletcher FD-25 light ground-attack aircraft.

By the mid-1960s the AVRK had been expanded and organised around a *Groupeement Aérien Tactique* (GATAC — Tactical Air Group), which supervised

**BELOW Graduates of the AVRK's 5th Pilot Class stand smartly to attention at their graduation ceremony at Pochentong airfield on April 12, 1964. Su Sampong, who finished in the top ranking of the class, is at the far left of the group. Several of the AVRK's six Dassault MD.315s are just visible lined up for the occasion in the background.**

SU SAMPONG VIA AUTHOR





**ABOVE** Another photograph from Su Sampong's personal photo album, this one shows the promoted cadets of the 5th Pilot Class posing with General Nhiek Tioulong, the Cambodian Army Chief of Staff and, briefly, Acting Prime Minister of Cambodia during February–August 1962. Su Sampong is standing fifth from left in the front row.

the *Groupe d'Intervention* (GI — Intervention Group) comprising one fighter squadron of Soviet MiG-17Fs, another of Douglas AD-4N Skyraiders, one of North American T-28Ds and a light ground-attack squadron of armed North American T-6Gs. Also under GATAC's command was the *Groupe de Transport* (GT — Transport Group) with C-47s and Ilyushin Il-14s; the *Groupe de Liaison* (GL — Liaison Group) with Cessna 180s, Yugoslavian UTV-56s, de Havilland Canada L-20 Beavers, Antonov An-2s and Dassault MD.315 Flamants, as well as Sikorsky H-19 and H-34, Mil Mi-4 and Sud Aviation Alouette II/III helicopters. In addition to these, the *Groupe Aérien d'Observation et d'Accompagnement au Combat* (GAOAC — Air Observation Group) operated Cessna L-19As and l'*Ecole Royale de l'Air Khmère* (ERAK — Royal Cambodian Air Academy) used Alcyons, Yak-18s, Cessna T-37Cs and Fouga CM.170 Magisters.

Cambodia was the first of the former Indochina states to introduce fighter jets into service, with the delivery of MiG-17Fs from the Soviet Union in 1963. The delivery of military equipment from China, however, led the USA to stop military aid

to Phnom Penh and withdraw its Military Advisory & Aid Group (MAAG Cambodia) in 1964. Both China and the Soviet Union despatched small military teams of advisers to Cambodia, but these kept a low profile, France continuing to be the main supplier of training and technology.

## TRAINING BEGINS

Su Sampong successfully completed the AVRK entry exam in 1960, followed by two years of officer training on a common course with Army cadets. In July 1962 he was sent to ERAK, where he began flight training on the Alcyon with French instructors. Much of the training programme was supervised by Master Sergeant André Bellouard, a former fighter pilot who had completed several tours of duty in Indochina flying Grumman F8F Bearcats. Most training flights were undertaken with two cadets, one in the front seat with the instructor, the other seated behind to observe and learn. On one training flight Su Sampong was alone with his instructor during a low-level navigation flight when the engine failed. The instructor took over and made a perfect belly

**Fouga CM.170 Magister "3" of l'Ecole Royale de l'Air Khmère (ERAK — Royal Cambodian Air Academy) circa 1966. The AVRK operated a total of four Magisters, the type being used initially for training, but later also for ground-attack duties. Artwork by TOM COOPER © 2020**





**ABOVE** Soviet advisers pose for a photograph beside AVRK MiG-17Fs during an inspection at Pochentong, along with Major So Satto, fourth from left, CO of the Groupement Aérien Tactique, in 1966. Uniquely during the Cold War, neutral Cambodia obtained the support of military advisory missions from France, USA, USSR and China.

landing in a cornfield, after which the pair waited for an H-19 helicopter to rescue them.

Su Sampong was finally awarded his wings after 150 flight hours, on April 12, 1964, finishing in the top ranking of the AVRK's 5th Pilot Class. He continued his training with a posting to the T-6G light ground-attack squadron, which included gunnery and rocket-launching exercises as well as flying regular patrols along the South Vietnamese border. After six months, he was selected for the jet conversion course, flying the T-37C and Fouga Magister under the tuition of French instructor Lt André Porte. After 50 flight hours in these types, he moved on to the two-seat MiG-15UTI trainer for an additional 80 flight hours, before converting to the single-seat MiG-17F fighter under the tuition of Cambodian instructors trained in the Soviet Union.

Su Sampong recalled appreciating the aerobic capabilities of the MiG-17F, along with its sturdiness and ease of maintenance:

"We had both Soviet- and Chinese-built MiG-17Fs. The former were secondhand airframes, painted light grey. The latter were brand-new, still in silver. The Chinese aircraft were also equipped with a radar-warning device on the tail, indicating if we had been tracked by an enemy radar. The first impression was of a very crudely equipped cockpit when compared to Western aircraft but with some simple and efficient devices, such as a white vertical line bisecting the instrument panel. If you entered a spin, you simply pushed the stick forward against the white line and left the pedals. After two to three turns, the rotation stopped and you could recover to a normal attitude.

"On the other hand, you could not adjust the

height of the ejection-seat. Our mechanics had to adjust them according to the average stature of our pilots. Also, the pneumatic braking system had to be handled with care while taxiing in order not to empty the pressurised air bottles."

Su Sampong also recalled the input of Soviet advisors during this period:

"There was a Soviet advisory team incorporating a small number of pilots, mainly involved in test-flying each MiG delivered and assembled, or after being repaired, before their introduction or re-introduction back into service. They also tried to help by writing flight and maintenance manuals in French, with the help of a secretary at the Soviet Embassy who served as a translator. The results were sometimes hilarious. For example, the radio compass was translated as being a 'piercing radio'. And that after lifting off the runway, instead of retracting the undercarriage, the pilot would retract 'the locomotive'!

"Major Gérard Gacoing, the French advisor supervising the Technical Department, did a herculean job of establishing precise catalogues of spares for our Russian-built aircraft by identifying each item and photographing each element. Otherwise, we socialised with the Russian pilots — their commander was Maj Stepanov — touring the restaurants of Phnom Penh. They seemed to appreciate very much our local rice alcohol!"

Su Sampong's fighter pilot training continued, with interception exercises, initially one-versus-one, before graduating on to two-versus-one. Sometimes a MiG-15UTI played the role of adversary, with the return flight becoming a low-level navigation exercise, the instructor trailing the young pilot. Next came gunnery training,





**ABOVE** A flight of MiG-17s taxi in at Pochentong after a sortie. By the mid-1960s, the AVRK's MiG-17s were a mix of Soviet-built MiG-17Fs and Chinese Shenyang J-5s, essentially identical licence-built versions. The MiG-17s, Nato reporting name Fresco, were regularly engaged in patrol missions along the South Vietnamese and Thai borders.

including air-to-air target practice, in which firing passes were made against a French-built target-banner towed by a T-28D. However, owing to the considerable speed difference between target and attacker, this kind of unrealistic training was suspended, and the MiG pilots practised using only their gun-cameras.

Once qualified as a fighter pilot, Su Sampong participated, along with pilots of the other attack squadrons, in the annual gunnery competition that took place at the Oudong bombing range, a former airfield built by the Japanese during the Second World War. There were also some bombing demonstrations for the cadets of the Army Academy as well as some strafing practice against floating targets positioned offshore. Air-defence exercises for the protection of Phnom Penh were also undertaken, in which groups of Skyraiders and T-28s attempted to pass through MiG-17F screening patrols over the capital. Other exercises included low-level simulated strafing passes over troops garrisoned on the island of Koh Rong in the Gulf of Thailand, contested by South Vietnam.

### TENSION RISES — AND TO FRANCE

Meanwhile, political tensions with Thailand began to rise owing to border disputes around the Preah Vihear Temple in the Dângrêk Mountains in northern Cambodia, prompting the AVRK to deploy a permanent detachment of transports and fighters to Battambang. Artillery exchanges took place and plans were laid for the AVRK to attack the Thai batteries with Skyraiders. Su Sampong, posted to Battambang, recalled:

"At the height of the crisis three patrols of MiG-17Fs took off each day. On some occasions our patrols were followed across the border by groups of Thai F-86Fs, but no incidents took place. Our presence had dissuaded the Thais from continuing to intrude into our airspace. We built a new airbase at Siem Reap, near the famous Angkor Wat temples, with Chinese help, to improve our coverage of the Thai border. I was part of the escort of six MiG-17Fs when Prince Sihanouk came in a C-47 to inaugurate the base."

Most of the Cambodian pilots would be sent to France on advanced foreign-officer training courses and Su Sampong, despite having already qualified as a fighter pilot, was despatched to France with Lt Kim Poun to attend the prestigious *Groupeement Ecole 314* (GE 314 fighter training school) at Tours for the equivalent *Armée de l'Air* (French Air Force) qualification. Arriving in February 1966, "I was summoned to the base commander, who was interested to know that I was already flying the MiG-17. However, he told me that I would be following exactly the same course as the other cadets. I was posted to the 4th EIV [Fighter Training Squadron] on Lockheed T-33s. I remember the sweat-drenching instrument-flying exercises with the canopy covered, simulating night-flying conditions.

"After 85 flight hours on the 'T-Bird' I moved to the 5th EIV for advanced training on the [Dassault] *Mystère IVA*. The unit then used two versions of the fighter, one with the Rolls-Royce [RB.44] Tay engine and another with the more powerful Hispano-Suiza Verdon 350 [improved licence-built] version. After very thorough theory



**ABOVE** During his fighter training in France, Su Sampong was able to make a direct comparison between the MiG-17s he flew with the AVRK and France's Dassault Mystère IVA, seen here, the first transonic aircraft to enter service with l'Armée de l'Air. He found the latter "smooth and precise", but preferred the rugged agility of the MiG.

courses and cockpit drills, we were cleared for our first take-off. I remember the noise of the still-spinning nosewheel being retracted as somewhat surprising. The aircraft also had a tendency to yaw in the climb as the undercarriage retracted.

"The controls were smooth and precise, but I preferred the MiG-17, which was more manoeuvrable, especially in terms of turn rate. The Russian fighter also flew higher and had better acceleration with its afterburner. I practised breaking the sound barrier beyond the island of Noirmoutier in the Gulf of Biscay in deep-dive manoeuvres. I also flew some sorties from Nancy-Ochey and Reims in eastern France, where you could feel the high operational pace during that intense Cold War period."

Su Sampong was involved in "bounces" on numerous occasions while transiting through local air-defence zones, as he recalled:

"The GCI [ground control intercept] controller sent you towards a bogey. I remember engaging USAF F-100Ds or German Fiat G-91s. Two German Starfighters that we were approaching from behind at low level lit their afterburners and literally left us standing. On another occasion we were vectored towards a high-flying target. From a distance I thought it was an F-84F with its two huge external droptanks hanging beneath. But on closer inspection it turned to be a Vautour IIN interceptor. I was amazed by the agility of such a big aircraft.

"I also remember mixing it with French F-84Fs. I even met one of their pilots who turned out to be a former South Vietnamese pilot that had defected, fleeing the despotic rule of President

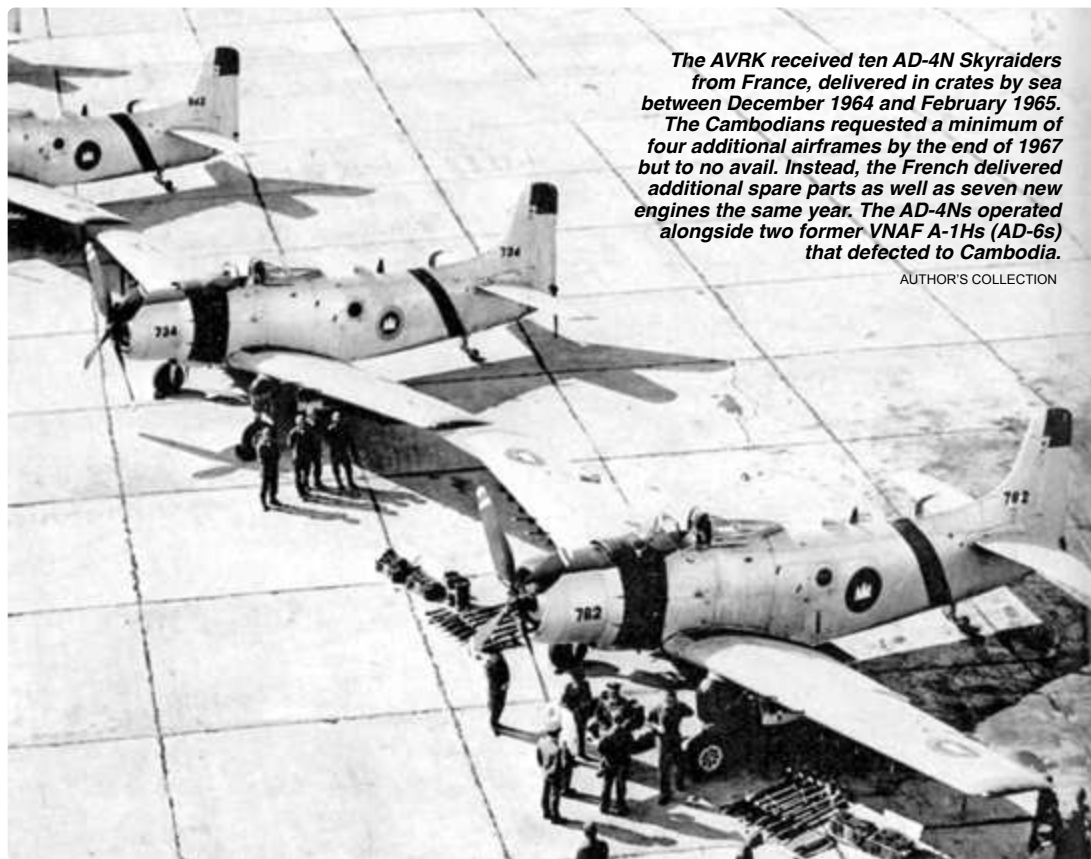
Ngô Đình Diệm. He had sought asylum in France, where he had been trained as a pilot. In order to get his French nationality he enlisted in the French Foreign Legion. He was then accepted back into the French Air Force."

## BACK TO CAMBODIA

Su Sampong was recalled to Cambodia in October 1966 after being awarded the coveted Armée de l'Air fighter wings. He recalled:

"My team mate and I were unable to continue with the advanced training phase of gunnery and bombing exercises with the 8<sup>e</sup> Escadre de Chasse [EC 8 at Cazaux] as planned. I don't know why that was scrapped but probably for budgetary reasons. The French military was in full reorganisation since the country had decided to leave Nato [in 1966] and we were told that there were no places left for foreign officers. I am proud, nevertheless, to have graduated from that prestigious school, where I learnt a lot about organisation, discipline and planning."

On his return to Cambodia Su Sampong found that the political situation there had deteriorated. Tensions between South Vietnam and its American ally plumbed new depths when Saigon closed the Mekong river to ships bound for Phnom Penh. Saigon also supported the Cambodian *Khmer Serei* (Free Khmer) anti-communist anti-monarchist guerilla force. With the financial backing of France, Sihanoukville, a new port in the Gulf of Thailand, was developed to circumvent the quasi-embargo imposed on the country. An airbase at the adjacent Ream Naval Base was also established.



*The AVRK received ten AD-4N Skyraiders from France, delivered in crates by sea between December 1964 and February 1965. The Cambodians requested a minimum of four additional airframes by the end of 1967 but to no avail. Instead, the French delivered additional spare parts as well as seven new engines the same year. The AD-4Ns operated alongside two former VNAF A-1Hs (AD-6s) that defected to Cambodia.*

AUTHOR'S COLLECTION

**BELOW** A poor-quality but rare photograph of Su Sampong (holding propeller tip) in front of one of the AVRK Skyraiders delivered during November 1964–October 1965, an action vehemently protested by the American government, which reportedly had expressed an interest in acquiring them for use in neighbouring Vietnam.



SU SAMPONG VIA AUTHOR





**ABOVE** By mid-1965, following a number of friendly-fire incidents, all AVRK AD-4Ns, including Bu No 125762 seen here, received an oblique identification band — red outlined in blue, Cambodia's national colours — around the rear fuselage to distinguish them from South Vietnamese and American Skyraiders. Artwork by TOM COOPER © 2020

Meanwhile, the North Vietnamese continued to expand their logistical operations organisation along the Laotian and Cambodian borders in order to support their troops, which had infiltrated South Vietnam. Sihanouk was unable, and to some degree unwilling, to oppose this. He even supported the North Vietnamese by authorising Chinese and Soviet freighters to dock at Sihanoukville to disembark military equipment, which was then ferried to the communist depots by an *ad hoc* civilian road transport company. In exchange, a portion of this equipment was retained for use by the Cambodian armed forces.

Occasionally AVRK C-47s were deployed to drop rice for the Việt Cộng. The USA reacted vigorously by increasing cross-border forays by Special Forces inserted by helicopters (e.g. Operation *Daniel Boone*) to assess the extent of the North Vietnamese installations. Occasional American air strikes were also undertaken against the North Vietnamese positions, prompting the Cambodians to deploy anti-aircraft units around the main border towns.

It was within this context that Su Sampong, who assumed that he would rejoin the MiG-17 squadron on his return, was ordered to convert to the AD-4N Skyraider, the AVRK being short of available pilots for the type. Fearing his own military, which opposed his policy of collaboration with the North Vietnamese and thus might stage a coup against him, Sihanouk curtailed further strengthening of his armed forces, resulting in a four-year halt in the training of additional AVRK personnel. With only 130 pilots available to fly the 145 aircraft in its inventory, the AVRK's operational capability began to suffer, and the air arm was forced to adopt a policy in which its pilots would maintain currency on several types of aircraft simultaneously. This naturally posed safety concerns; a pilot who usually flew a MiG-17F may be ordered to fly a sortie in a T-28D, despite potentially not having flown the latter type for several months. Su Sampong, in

common with all his fellow fighter pilots, was required to retain currency on every type in the GI's inventory.

The commander of GATAC, Lt-Col So Satto, organised training sessions on different types of aircraft on a calendar in order to keep each pilot current with the bare minimum of hours on each type. The French instructors organised refresher and advanced courses to be completed on the MS.733s and Magisters. The French advisory mission also did its utmost to sustain AVRK operations by developing local maintenance infrastructure. By 1968 the Cambodians were able to overhaul several types of aircraft, but the USA's embargo on spares hit the operational availability of the American-built aircraft. The problem was partly circumvented by purchasing spares for the L-19As, H-19s and AD-4Ns directly from France, which also operated those types. Other heavy maintenance, such as work needed on the C-47s, was completed by the Hong Kong Aircraft Engineering Company (HAECO) in Hong Kong.

## SKYRAIDER OPERATIONS

Su Sampong was favourably impressed by the brute power and warload-carrying capability of the Skyraider, as he recalled:

"We had ten AD-4Ns donated by the French. These airframes had been extensively used during the Algerian War and some also apparently came from those deployed in Djibouti. They were already weary and required a lot of maintenance. The powerful Wright R-3350 engine required a lot of "boot" to counter the strong gyroscopic torque on take-off but, in flight, the aircraft was superbly agile. I was able to turn inside MiG-17s during low-speed dogfights.

"In addition to the four 20mm cannon, we usually carried six French-built 250kg bombs or 12 x 105mm T-10 rocket-projectiles. There were three South Vietnamese A-1H [AD-6] pilots that sought asylum in Cambodia: one belly-landed, his aircraft heavily damaged by his wingman,



**ABOVE** An AVRK North American T-28D Trojan departs for a patrol mission over Cambodia in 1969. The AVRK had originally attempted to acquire T-28 Fennecs from France in early 1962; but, after the deal fell through, the air arm's first 16 T-28Ds were acquired in August that year, courtesy of the USA's Military Advisory & Aid Group (MAAG).

who had tried to shoot him down when he defected. We put the other two into service, one being repainted in an olive-drab scheme.

"We regularly patrolled the South Vietnamese border in sections of two aircraft, usually in the Châu Đốc sector, before turning towards Svay Rieng and heading back towards Phnom Penh. Another patrol pattern was a direct heading south towards Pung Taek, before following the meander of the border at 500ft [150m]. We also flew down the Bassac River until we reached the area opposite Hà Tiên [in South Vietnam]. On reaching the border our radio headsets were full of conversations in English and Vietnamese, translating information about the intense combat activity taking place on the other side.

"We alternated patrols with T-28Ds. One T-28 pilot, Capt Sisowath Monirak, shot down a South Vietnamese Cessna O-1 in the Parrot's Beak area [a salient of Svay Rieng Province], killing its pilot and American observer. On another occasion, two of our Skyraiders, flown by Capts Om Konn and Nady Tan, were engaged in the Svay Rieng area by two USAF [Convair] F-102As. In the ensuing mêlée, Om Konn succeeded in turning inside one of the Americans, who soon after retreated across the border. The South Vietnamese retaliated by increasing incursions. Two of their A-1Hs were forced to retreat after being intercepted by the MiG-17Fs of Capts Pal Sam Or and Sok Sambaur.

"On several occasions, we were fired on by our own anti-aircraft batteries positioned along the border, their gunners confusing our Skyraiders with those of the USAF and the Republic of Vietnam Air Force (RVNAF—South Vietnamese). So we decided to paint an oblique identification

band, red outlined in blue, our national colours, around the rear fuselage. I remained doubtful about their efficacy, as RVNAF Wings had their own distinctive colourful fuselage identification bands. We were also mobilised to escort the numerous inspection tours made by Prince Sihanouk throughout the country. He remained very popular and revered, particularly in the countryside. Each time, a bunch of officials accompanied him aboard several C-47s and MD.315s. During these propaganda tours, to reach the most remote villages, he arrived in an Alouette helicopter to distribute food etc.

"During one of these escort missions, while in the landing pattern for Kratié airstrip, my Skyraider's oil temperature suddenly shot up; I tried to regulate it by opening the engine's cooling gills, but the engine just vibrated more and more before stopping completely while I was around a kilometre off the threshold of the runway. No choice now, I decided to make a crash-landing straight ahead on flat terrain with small trees. After violent contact with the ground, the aircraft continued to slide on until stopping in a cloud of dust. Still shocked, I realised how the Skyraider's immensely strong structure had saved me — I was not injured at all. Opening the hood, I realised how lucky I had been — the port wing had been torn off, as had the engine. A piece of propeller blade had semi-pierced the front thick glass of the windscreen. An Alouette II immediately picked me up, just in time for the toast of Prince Sihanouk given at the local governor's house!"

Su Sampong also remembered another royal escort mission, this time of a different kind:



***My Skyraider's oil temperature suddenly shot up; I tried to regulate it by opening the cooling gills, but the engine just vibrated more and more before stopping completely while I was around a kilometre off the threshold of the runway...***

"I was flying an escort mission in a MiG-17F, accompanying two RAF Hawker Siddeley 748s, one carrying Princess Margaret, who was on an official visit to Cambodia. I was told by our airport's personnel that one of the 748s carried a lot of bottles of gin and other alcohol, but I could not swear that was true. I was also selected to establish a formation aerobatic demonstration team with four Fouga Magisters. We trained hard and developed a programme with rolls, breaks and Cuban-eights. As we had no smoke generators to produce the required smoke trails in the colours of our national flag, a solution was found when we approached the director of Esso Cambodia, who furnished us with coloured fuel that we pulverised through the wings' tip tanks."

## RISE OF THE KHMER ROUGE

Although Prince Sihanouk was maintaining an accommodation with the North Vietnamese at this time, he would not tolerate any local communist opposition to his rule, hunting local militants who later became part of the Communist Party of Kampuchea (CPK — aka Khmer Rouge). The latter began to organise in the Samlaut area of Battambang Province, where local peasant uprisings took place against corrupt local authorities in March 1967, and launched attacks against police and army outposts. The nascent insurgency was ruthlessly suppressed, and the AVRK was fully mobilised, first deploying armed T-6Gs, with T-28Ds and AD-4Ns joining later.

Su Sampong remembered being sent to attack "red villages" with rocket-projectiles and strafing runs. While operations continued against the Khmer Rouge, patrols were maintained along

the South Vietnamese border. Having qualified on the T-28D Su Sampong was deployed on 15-day rotational deployments to advanced airstrips in Labansiek (now Banlung), Stung Treng and Mondul Kiri Provinces, and remembered:

"Despite our spartan living conditions on these jungle strips, our T-28s were always ready to take off thanks to the hard work of our mechanics. You had to be aware of rats that infiltrated the aircraft and bit through electrical wires, however. One day during a take-off run I was unable to accelerate, even at 2,000 r.p.m. I cancelled and returned to the ramp, where our mechanics discovered a bird's nest atop the carburettor! Logistical support on these laterite airstrips was provided by the An-2s of the Groupe de Liaison, and I took advantage of the opportunity to take some flights in them.

"At Labansiek we regularly had to tackle RVNAF Skyraiders intruding into our airspace, operating from Pleiku. Our presence there was noted by the Americans, who sent RB-57s to take pictures of our small airfield. There were also forays by USAF F-100s, which bombed our anti-aircraft artillery [AAA] positions under the pretence that they were North Vietnamese AAA batteries that had fired on them. On another occasion the Americans bombed one of our outposts at Bu Krak, which faced a small airstrip just across the border which sometimes accommodated RVNAF [Cessna] O-1s. The Việt Cộng once mortared it. Using this as a pretext, the F-100s retaliated and annihilated our position, killing 24 of our troops. I escorted the C-47 that brought in the enquiry team of the International Control Commission [created in 1954 after the





**An extremely rare colour photograph showing the various types in service with the AVRK in 1968. Lined up on the taxiway at Pochentong are a total of seven Douglas C-47s; two Ilyushin Il-14s; four MD-315 Flamants; four T-28D Trojans, ten AD-4N Skyraiders and two MiG-17Fs — an extraordinary mix of Western and Soviet aircraft types. AUTHOR'S COLLECTION**



**ABOVE** AVRK MiG-17Fs being prepared at Pochentong in March 1970 for another ground-attack sortie against North Vietnamese forces, for which each was fitted to carry two Soviet-built FAB-250 250kg (550lb) bombs. Parked in the background are a pair of Gardan GY-80 Horizon trainers, acquired to replace the AVRK's obsolete Alcyons.

First Indochina War, with delegates from Canada, India and Poland] as well as an Army mine-clearing team that defused an unexploded 750lb bomb at the entry of the town of Mondul Kiri.”


### SIHANOUK CHANGES TACK

By early 1969 the massive presence of North Vietnamese forces along the border with South Vietnam had begun to pose problems for the Cambodians, with numerous incidents taking place. AVRK aircraft overflying the area were also fired on by the communists. The situation began to spiral out of Sihanouk's control, and he decided to renew diplomatic relationships with Washington and agreed that the Americans could bomb North Vietnamese bases inside Cambodia.

As a result, President Nixon ordered Operation Menu (March 1969–May 1970), sending B-52s to attack targets in Cambodia; their crews, however, were ordered to complete their mission reports as having being flown inside South Vietnam, a fact only uncovered by US Congress several years later. The North Vietnamese did not protest as they claimed to have no troops in Cambodia. The AVRK was also ordered to undertake occasional attacks on Việt Cộng targets, usually made by Skyraiders at dawn. The North Vietnamese ambassador's complaints were brushed aside by the Cambodians, stating that the raids had probably been undertaken by American or South Vietnamese aircraft. Meanwhile, the AVRK resumed its recruiting and training programme, ERAK taking delivery of 16 new Gardan GY-80 Horizon trainers to supplement the Alcyons, and inducting a new batch of French instructors.

Tensions in the region rose again when the Cambodians launched an offensive against North Vietnamese-supported Khmer Rouge bases in

Mondul Kiri Province. The AVRK supported ground forces with T-28Ds and Skyraiders, although serviceability of the latter was becoming perilously low, with no more than three to four aircraft available each day. Phnom Penh hoped that the French would agree to overhaul the Skyraiders or donate additional airframes.

In March 1970 Sihanouk suddenly suspended the military campaign and opened negotiations with Hanoi, even exchanging prisoners. While his military pushed him to break with the communists, Sihanouk went to Paris, then Moscow and Beijing to seek assistance from Soviet and Chinese leaders to persuade the North Vietnamese to reduce their presence, as well as negotiate the acquisition of a batch of MiG-21s for the AVRK. While Sihanouk was in Moscow the Cambodian Prime Minister, General Lon Nol, took power and proclaimed a Republic on March 18, 1970. Five days later in Beijing, Sihanouk declared an alliance with his erstwhile arch-enemy, the Khmer Rouge, establishing the *Front Unifié National Khmer* (FUNK — United National Khmer Front). This development created turmoil within the newly renamed *Aviation Nationale Khmère* (AVNK), in which many officers of aristocratic origin were suspected of disloyalty to the new regime. Such was the case for Su Sampong, who was interrogated by the military security forces because his mother, in Prague with one of his uncles (the Cambodian Ambassador), refused to return to Cambodia to pledge loyalty to Lon Nol. He never saw his mother again; she died three years later in Czechoslovakia. 

**NEXT TIME** In the second part of the series Major Su Sampong recalls flying MiG-17Fs, Fouga Magisters and T-28Ds in the ground-attack role during 1970–73





# WINGS OVER PERU

## The **Nieuport-Delage 121C1** in **Cuerpo de Aviación del Perú** service

Latin American aviation specialist **AMARU TINCOPA** continues his occasional series on the history of military aviation in Peru with the story of the 12 French Nieuport-Delage NiD 121C1s operated by the *Cuerpo de Aviación del Perú* during 1934–39 — a short career for what proved to be a rather undistinguished parasol-wing monoplane fighter

**F**RANCE'S CHASSE 1 (C1 — Fighter 1) Specification of 1930 called for a state-of-the-art single-seat fighter for the *Armée de l'Air* (AdA — French Air Force), to be powered by a 650 h.p. engine and capable of a minimum top speed of 350km/h (217 m.p.h.) at 4,000m (13,100ft) and an operational service ceiling of 9,000m (29,500ft). Accordingly, the Nieuport-Astra company (to become the Nieuport-Delage Co in the 1930s) began studies for a new light fighter in compliance with those parameters. In 1931 the result, the Nieuport-Delage 120-series, was submitted for consideration, along with 27 other designs offered by several French manufacturers.

The NiD 120C1 base design was a parasol-wing monoplane of all-metal construction. The

fuselage comprised a metal structure covered with duralumin panels, with the wing, supported by a Y-type strut, incorporating a cutout above the cockpit to allow the pilot to raise the seat so that his head protruded just above the wing. Another distinctive feature of the type was the engine-cooling system, incorporating radiators built into the wing, with the air sucked in through slots in the leading edges and expelled through the trailing edges after circulation. Other innovative features of the NiD 120-series included the installation of a CO<sub>2</sub> fire-suppression system, a complete radio transmitter/receiver suite and a pneumatic brake system for the mainwheels of the fixed undercarriage.

Two prototypes were produced: the NiD 121C1, powered by a 650 h.p. liquid-cooled V12 Lorraine

**BELOW** The Hispano-Suiza 12Xbrs-powered Nieuport-Delage NiD 122C1 at the Centre d'Essais de Matériels Aériens at Vélizy-Villacoublay in July 1932. The Nieuport-Astra company was renamed Nieuport-Delage in the 1930s in honour of Gustave Delage, the company's chief designer and manager during the First World War.

MICHEL LIEBERT VIA AUTHOR







JOËL MESNARD COLLECTION

**ABOVE** The NiD 121C1 prototype, powered by a 650 h.p. Lorraine 12Hars Pétrel engine, shows off its classic 1930s lines during a photographic sortie. Note the cutout in the centre section of the parasol wing, which provided the pilot with a good field of vision in all directions; also the radiator slots incorporated into the wings' leading edges.

12Hars Pétrel engine, and the NiD 122C1, fitted with the similar but more reliable Hispano-Suiza 12Xbrs V12 engine of the same power. The latter was the first of the two prototypes to fly, on July 23, 1932, in the hands of test pilot Joseph Sadi-Lecointe. The NiD 121C1 made its maiden flight on November 25, 1932. Unfortunately, the 122C1 prototype was destroyed in an accident on April 13, 1933. The aircraft was performing a low-level pass in front of members of the French Parliament when it lost a wing section owing to severe vibration, crashing and killing its pilot. Testing, however, continued with a second 122C1 prototype, which flew for the first time in July 1933. The results of the tests of the prototypes were promising, with the NiD 121C1 reaching an impressive top speed of 367km/h (228 m.p.h.).

The AdA, however, selected the Dewoitine D.500 as the winner of the competition, discarding the Nieuport-Delage design owing to its weak undercarriage, perceived vulnerability of the radiator to combat damage and poor stability at high angles of attack. In order to compensate the company for its development expenses, the French government authorised Nieuport-Delage to offer the type for the export market.

### Meanwhile, in Peru...

At the same time, the *Cuerpo de Aviación del Perú* (Peruvian Aviation Corps – CAP) was embarking on a modernisation process aimed at countering the numerical advantage of the *Aviación Militar de Colombia* (Colombian Military Aviation) during the so-called “Putumayo Conflict” — the unofficial war between the two countries for the control of a large land section between the

Caquetá and the Putumayo rivers in the Amazon forest during 1932–33. Colombia had achieved this numerical superiority thanks to a large — and early — modernisation programme of its own, established shortly after the beginning of the hostilities with Peru. The Peruvian government, initially confident of a quick victory over the then-underarmed Colombians, tried to counter the latter's response, but lack of political cohesion led to precious weeks wasted on political debates before Congress could authorise the foreign debt required to bolster the nation's military.

Once the funds became available, the Peruvian government sent Purchasing Commissions overseas, one being despatched to France after the Peruvian *Ministerio de Guerra* (MG — War Ministry) had been contacted by Paul Dietrich, representative of the French *Société Générale Aéronautique*, a consortium incorporating manufacturers including Hanriot, CAMS, Nieuport-Delage, Lorraine and Amiot. Once in France, the Peruvian Commission visited the Potez, Nieuport-Delage, Morane-Saulnier and Hanriot factories for the evaluation of various types.

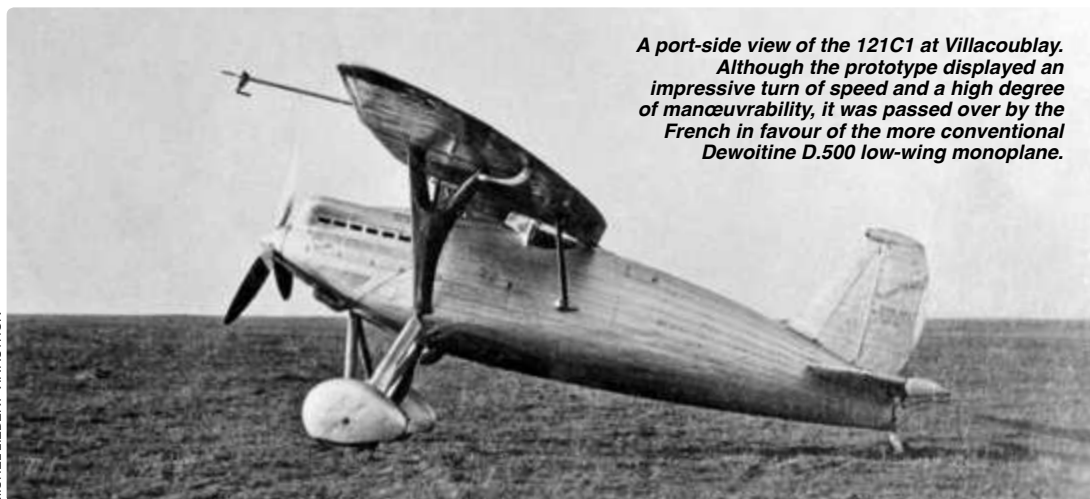
In early March 1933, during a visit to the Nieuport *Centre d'Essais de Matériels Aériens* (Aeronautical Research & Test Centre) at Vélizy-Villacoublay, south-west of Paris, the Peruvian delegation was shown the NiD 121C1 prototype, the aircraft being offered as a fast, modern fighter capable of outrunning and outclimbing the USA's Curtiss Hawk II biplane, Colombia's main frontline fighter at the time. With few options available, and despite the machine still being under development, the CAP representatives reached a pre-agreement with the manufacturer



**ABOVE** Another fine view of the NiD 121C1 prototype in flight, showing more of the unusual wing-mounted radiator configuration. Although such an arrangement was an ingenious way of keeping overall drag down, it made the fighter unacceptably vulnerable to enemy gunfire, a single well-aimed wing hit being potentially disastrous.



**ABOVE** The prototype NiD 121C1 at the Nieuport-Delage factory at Villacoublay in late November 1932. The 121C1's Lorraine Pétrél liquid-cooled engine was an upright V12 with two banks of six cylinders, arranged at 60° to each other, driving a common crankshaft, and was used to power a number of French aircraft of the 1930s.



**A port-side view of the 121C1 at Villacoublay.**  
Although the prototype displayed an impressive turn of speed and a high degree of manoeuvrability, it was passed over by the French in favour of the more conventional Dewoitine D.500 low-wing monoplane.



**ABOVE** The 121C1 prototype fitted with floats for trials at Sartrouville, north-west of Paris. On July 18, 1934, a NiD 123C1 floatplane version fitted with a Lorraine 12Hdrs engine was evaluated by the CAP commission, which found its characteristics unsatisfactory and advised against its purchase. The CAP still acquired a total of 12 NiD 121C1s.

and committed to buy a batch of ten machines on the proviso that the following modifications be implemented:

- replacement of the original 650 h.p. Lorraine 12Hars with the upgraded 720 h.p. Lorraine 12Hdrs;
- installation of machine-guns capable of firing 7.65mm-calibre ammunition;
- installation of underwing racks for a total of 120kg (265lb) of bombs;
- aircraft should be capable of operating with floats or wheels with no loss of performance.

In order not to leave Peruvian skies undefended while the modifications and production tooling process for the 121C1 ordered by the CAP took place, the manufacturer offered to ship three examples of the NiD 626 parasol fighter, an export version of the NiD 62C1, powered by a Lorraine Pétrél engine, to Peru. Although initially finding the proposal attractive, the CAP ultimately declined the offer after a report from its Technical Committee ruled the type unsuitable for use in the harsh environments of the Amazon rainforest, owing to its wooden construction.

After numerous delays, a NiD 121C1 was

finally shown to Peruvian officers in September 1933. This example, however, was fitted with a 550 h.p. Pétrél engine instead of the proposed 720 h.p. Lorraine 12Hdrs, as the latter was still in the development stage.

The original order for ten 121C1s was confirmed by the Peruvian government and, as the purchase of the trio of NiD 626s had been declined, the CAP opted to increase the 121C1 order to a total of 12. After nearly two years from the date of the original order, Nieuport-Delage finally began deliveries of the fighter in December 1934, which were completed in February 1935.

### Into (short) service

The arrival of the NiD 121C1s came some six months after the signing of a peace treaty between Colombia and Peru in June 1934, meaning that their planned deployment to the Amazon was put on hold. However, a five-aircraft *escadrille* was activated at Ancón in northern Peru as part of the *III Escuadrón de Aviación* (III EA — Third Aviation Squadron). This unit, designated 4<sup>to</sup> *Escuadrón Mixto* (4th Mixed Squadron), began crew conversion on to the type in December 1934

**At least six NiD 121C1s and four Potez 390A2s (A2 refers to the French Artillerie Biplace — two-seat observation aircraft — specification designation) are visible in this rare photograph of a CAP ceremony at Las Palmas airfield in September 1936.**

AUTHOR'S COLLECTION







**ABOVE** The NiD 121C1's narrow and rather spindly undercarriage was the cause of several accidents during the type's career with the CAP. On May 9, 1935, NiD 121C1 serial 4-C-5 of the 4<sup>o</sup> Escuadrón Mixto sustained substantial damage while taxiing back to the hangars on the beach at Alférez Carlos Huguet seaplane base in Ancón.

and it was during this period that it recorded its first accident in Peruvian service.

On May 9, 1935, as the pilot of NiD 121C1 serial 4-C-5 was taxiing to the hangars at Ancón after completing a training sortie, the undercarriage sank into soft sand, causing the aircraft to tip up on to its nose and sustain moderate damage to the fin, propeller and engine. The aircraft was transported to Las Palmas airfield near Lima, where repairs were undertaken but not completed until early 1937. A few months after the accident, the four remaining Ancón-based 121C1s were also transferred to Las Palmas, where they joined the other examples as part of the newly activated 2 *Escuadrón de Caza* (2 EC — Second Fighter Squadron), a fighter unit assigned to II EA, being allocated CAP serials 2-C-1C to 2-C-12C.

Peruvian pilots appreciated the 121C1's speed and climb rate, although novice pilots found the

type somewhat unforgiving, especially during landing. On July 9, 1936, 2-C-3C was damaged after it tipped over during landing. The CAP lost a 121C1 on October 21, 1936, when 2nd Lt Silva Boggiano crashed in 2-C-7C during a mock dogfight against a Caproni Ca.114 biplane over the base. Boggiano had executed a tight turn, causing his aircraft to stall and crash into one of the hangars when his wingtip hit the roof of the building. Boggiano was killed and a pair of mechanics working on a Vought O2U-1E Corsair in the hangar were seriously injured.

In January 1937 the nine surviving 121C1s of 2 EC were deployed to Vitor in Arequipa Province in southern Peru, to the newly inaugurated Capitán Guillermo Protzel del Castillo airbase, in accordance with the Air Force Strategic Distribution Plan put in place the previous year. Construction of this airbase, home of the Second

**BELOW** A CAP NiD 121C1 starts its take-off run from the grass runway at Las Palmas in early 1937. The Cuerpo de Aviación del Perú was formed in May 1929 and renamed the Cuerpo Aeronáutico del Perú in 1938. By the mid-1930s the CAP was equipped with a motley collection of various types from the UK, America, Italy and France.

AUTHOR'S COLLECTION





**“Peruvian pilots appreciated the 121C1’s speed and climb rate, although novice pilots found the type somewhat unforgiving, especially during landing...”**

**ABOVE** A line-up of NiD 121C1s of 2 Escuadrón de Caza before their deployment to Vitor in Arequipa Province in January 1937. The following year Peru began another rearmament process, acquiring much more modern American fighters, including the Curtiss Hawk 75A-8 (as covered by the author in TAH26) and Douglas 8A (TAH31).

Air Region, began in May 1936 and, along with the forward airfields in Juliaca and Tacna, was part of the defensive plan for the south of the country. Given the short range of the Nieuport-Delages, they were first sent to Ancón, where they were fitted with floats before flying south to Pisco, Marcona and Mollendo on the Pacific coast. Once at Mollendo harbour the machines were sent by rail to Arequipa, where they were reassembled and flown to Vitor airbase nearby.

### Forced abandonment

In 1936 a series of nationwide labour strikes in France hit the country’s aviation industry, leading to the nationalisation of some 80 per cent of the nation’s aircraft manufacturers, which were combined into seven *Société Nationales* (National Companies). However, it took months for French industry to recover from the forced halt on production. In the meantime, irreparable damage was inflicted on the supply of spares and customer support for aircraft supplied to foreign air forces, including the Potez 390s and NiD 121C1s of the CAP. By the end of 1937 only a handful of 121C1s were still airworthy, and CAP requests to the recently created *Office Français d’Exportation de Matériel Aéronautique* (OFEMA — French Aeronautical Materiel Export Office) for the provision of critical spares received no meaningful or useful reply.

In late 1938 the lack of spares for the 121C1s’ Pétrel engines — caused by logistical problems in France as a result of the absorption of Nieuport-Delage into the *Société Nationale des Constructions Aéronautiques de l’Ouest* (SNCAO) — became a critical factor in the CAP High Command’s decision to retire the 121C1 from service. By early 1939 all had been grounded, forcing the Peruvian *Comandancia General de Aeronáutica* (GCA — Aeronautics High Command) to withdraw the NiD 121C1 from service, selling the surviving airframes as scrap in October 1940.



### Nieuport-Delage 121C1 data

**Powerplant** 1 x 650 h.p. Lorraine 12Hars Pétrel  
12-cylinder V12 liquid-cooled piston engine

#### Dimensions

Span	13.0m	(42ft 8in)
Length	7.18m	(23ft 7in)
Height	3.02m	(9ft 11in)
Wing area	22m <sup>2</sup>	(237ft <sup>2</sup> )

#### Weights

Empty	1,433kg	(3,159lb)
Maximum	2,000kg	(4,409lb)

#### Performance

Maximum speed	368km/h	(229 m.p.h.)
Service ceiling	9,900m	(32,500ft)
Range	800km	(500 miles)



# ARMCHAIR AVIATION

**We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from hot-off-the-press publications to reissued classics**

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## **The Bell P-39 Airacobra and P-63 Kingcobra Fighters: Soviet Service During World War II**

By Yefim Gordon and Sergey Komissarov with Dmitry Komissarov; Schiffer Military; 4880 Lower Valley Road, Atglen, PA, 19310, USA; 8½in x 11in (216mm x 279mm); hardback; 240 pages, illustrated; \$50. ISBN 978-0-764356-80-3

THE SUBJECT OF direct Allied aid to the Soviet Union during the Second World War, by means of Lend-Lease and other programmes, and the influence of this aid on the course and outcome of the war, is of abiding importance. Yet, there has been no comprehensive study of the subject. Even 75 years after VE-Day, the space remains wide open for half-truths and outright deception, as demonstrated most recently by Vladimir Putin's claim that Allied aid amounted to only "seven per cent of the total military production of the Soviet Union". It is unfortunate that this book contributes so little either to the understanding of the wider historical subject, or to the specific theme of aviation history that it attempts to tackle.

The authors have written extensively about Russian and Soviet aircraft and it is particularly significant that Sergey Komissarov is both a former diplomat and the present editor-in-chief of *Krylya Rodiny* (Wings of the Motherland) magazine, a publication which is closely linked to the International Association of Aero-Engine Manufacturers, a Russia-based lobby for the post-Soviet engine industry. It is clear that such connections give the authors privileged access to photographic collections, as well as technical manuals and test reports, which still remain largely inaccessible to outsiders. However, it is equally apparent that the authors' work went little further than the collation of photographs and extracts from the reports, the latter largely consisting of those of the NII VVS (Air Force Scientific Research Institute) and the BNT NKAP (Bureau of New Technology of the People's

Commissariat of the Aviation Industry).

This superficiality becomes clear from the very beginning of the book, as most of the space in the acknowledgments section is taken up by a list of 55 websites, which include such embarrassing references as the yaplaka.com entertainment forum and the ok.ru social network, which has been blocked in Ukraine on security grounds. While even authoritative aviation histories sometimes omit source references, this particular work does not even include a bibliography, so its sources remain almost entirely obscure.

When the authors do make reference to published sources, they repeatedly fail to identify them. Phrases such as "an American author wrote" recur on dozens of occasions, an abuse of the reader's patience which the publisher should have intervened to prevent. Even when making a specific statement of fact, that 4,952 Airacobras were delivered to the USSR, the authors only vaguely refer to "Russian archive materials". Whatever these may be, Von Hardesty and Ilya Grinberg's widely-available *Red Phoenix Rising: The Soviet Air Force in World War II* (University Press of Kansas, 2012) presents alternative data. Provided to the American authors by Ukrainian aviation historian and *TAH* contributor Valeriy Romanenko, Appendix 6 of that book states that 4,741 Airacobras were received. The authors fail to acknowledge or investigate this discrepancy. The silence goes further, for neither of Romanenko's two Russian-language books on early Soviet Airacobras are mentioned by the authors, even though these remain for the moment the most authoritative source on this subject.

The structure of the book is predictable and rather pedestrian. Five chapters on the Airacobra, including one on aces, are followed by one chapter dedicated to the later Kingcobra, one more on the post-war use of the Bell fighters and a final one on the little-known Soviet attempts to produce a similar design. Only the last chapter, with its drawings of several highly





unusual Soviet projects, presents information which is substantially new.

The sole strength of the book lies in the illustrative material; 376 monochrome and 22 colour photos, 46 aircraft profiles and 18 technical drawings. The highest-quality images come from American sources and from the collection of the NII VVS. Of greatest interest, although of lower quality, are those of Soviet personnel, including a two-page spread of portrait photos of famous aces. This book can be recommended only to those who are sufficiently interested in such photos to tolerate the inadequate text that accompanies them.

DAN ZAMANSKY

### ***Don't Let Them Bag the Nines: The First World War Memoir of a de Havilland Pilot — Capt F. Williams MC DFC***

*By Captain F. Williams; The History Press, 97 St George's Place, Cheltenham, Gloucestershire GL50 3QB; 5½in x 8in (133mm x 203mm); hardback; 191 pages, illustrated; £12.99. ISBN 978-0-750991-31-5*

THE TITLE OF this little book, which is not explained until the reader reaches page 145, refers to the resolve of the crews of the Rolls-Royce-powered de Havilland D.H.4s of No 55 Sqn RFC/RAF to protect the crews of Nos 99 and 104 Sqn in their D.H.9s with their unreliable BHP engines during bombing raids over enemy-held territory.

This first-hand account of Capt Williams's flying experiences had lain neglected and unappreciated in manuscript form in an old trunk for many decades. As a primary reference it is fascinating, providing a unique insight into the daily operation of a bomber squadron in the later war years. What lets it down somewhat is the shortage of dates for many of the operations described, which would have made this little

volume more useful. Nonetheless, it is a worthy addition to the literature. (Incidentally, why do so many pilots and aircrew insert a rogue extra "e" in Very pistol?)

The illustrative aspect is rather poor, and could have been greatly improved with the use of glossy paper and a bit of picture research, which would have enabled the awful faked air-to-air image and the take-off shot of an American D.H.4 to be replaced by something better and more relevant. But one cannot cavil at the price.

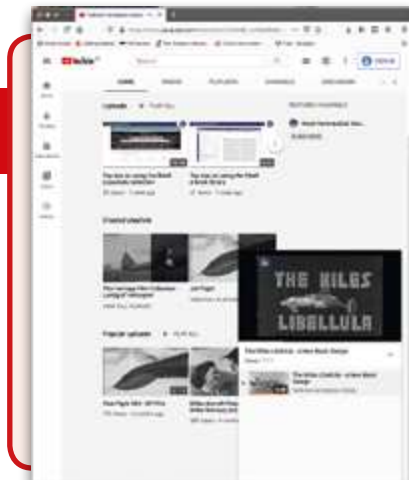
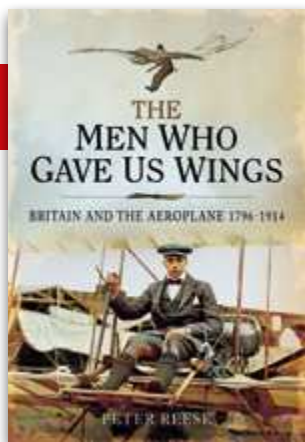
PHILIP JARRETT

### ***Blue Streak — Britain's Medium Range Ballistic Missile***

*By John Boyes; Fonthill Media Ltd, Millview House, Toadsmoor Rd, Brimscombe, Stroud GL5 2TB; 6½in x 9½in (165mm x 241mm); hardback; 224 pages, illustrated; £25. ISBN 978-1-781557-00-6*

THE BLUE STREAK Medium Range Ballistic Missile (MRBM) was the last independent strategic nuclear delivery system developed in the UK. Designed as the immediate successor to the V-Bomber force, this is part of an admittedly short list. This is a fine history of a mighty example of technological and strategic hubris.

It is also comprehensive. From the tentative and sometimes sceptical origins of British rocketry to the extended epilogue of the Skybolt fiasco, Boyes describes the development and planned deployment of the missile system and its infrastructure. The latter is perhaps the most fascinating aspect of the book; he describes the testing facilities both in the UK and in Australia and, arguably most intriguing of all, the belated plans to base the missiles in silos across southern England — belated in the sense that even by the time Defence Minister Duncan Sandys (that man again) staked Britain's strategic military future on the missile (and Blue Streak in particular),



land-based and slow-response liquid-fuelled weapons were vulnerable to what nuclear strategists would come to call a first strike.

But it was not independent. Developing Blue Streak was very expensive, and would have cost even more without access to technology from the USA, which came following changes in the early 1950s to American law prohibiting nuclear co-operation. This allowed the UK to benefit from Atlas rocket technology and provided important insights into warhead design and re-entry data. The latter was aided by developing the homegrown Black Knight research missile to test re-entry vehicles. All of these links are well and clearly explained.

By 1958 doubts about Blue Streak began to emerge within the UK military and political establishment. The Admiralty and other sceptics began to look across the Atlantic to the submarine-launched Polaris missile system. Even the committed Sandys had concerns about the ability of UK companies to deliver the Blue Streak programme. Again, Boyes is as adept with the politics as with the technology. With costs escalating and doubts increasing about Blue Streak's credibility as a survivable deterrent, cancellation came in 1960, causing acute embarrassment to the government.

Access again to American kit — this time the air-launched Skybolt — seemed to provide a route to maintain a semblance of independence. The Vulcan proved to be the only suitable carrier and all looked well — at least until a new American administration unilaterally pulled the plug on Skybolt. More embarrassment was this time saved by negotiating the purchase of Polaris missiles, another complex episode comprising technical details and high and low politics, all described with skill and in a lively, readable style.

There is a short coda on the European Launcher Development Organisation (ELDO), for which Blue Streak provided a successful first stage, but the protracted struggle by the

Labour government of the mid-1960s to end even this commitment is rightly glossed over. Sadly, only the prospective Black Arrow satellite-carrier would briefly sustain British rocketry.

There are more detailed works available on the development of Britain's "Bomb" and the evolution of UK nuclear strategy; but, taken as a whole, this book fills an important gap in post-1945 aerospace history, as well as the development of UK nuclear weaponry.

**PROFESSOR KEITH HAYWARD FRAeS**

### ***Hergé, Tintin et les Avions***

*By José Miguel de la Viuda Sainz; Éditions Moulinsart, 162 Avenue Louise, B-1050 Brussels, Belgium; 9in x 12in (229mm x 305mm); hardback; 64 pages; illustrated; €14.50 + p&p. No ISBN*

FROM THE FIRST time that the boy reporter appeared in a book, aircraft have always played a part in the stories. The brand owners have now produced a delightful book tracking Tintin's, and his friends' relationship with things aerial. What a span it is, from a Daimler-Klemm L-20 and a Polikarpov I-1 in *Tintin in the Land of the Soviets* to the Carreidas 160, a three-engined "swing-wing" supersonic business jet built by Laszlo Carreidas — "the man who never laughs" — in *Flight 714*, the penultimate completed Tintin adventure. As an interesting aside, Hergé modelled Carreidas on Marcel Dassault.

In virtually every book, aircraft appear, sometimes fleetingly, other times crucial to the plot. An example of the latter is the Arado 196 in *The Shooting Star* from which Tintin parachutes on to the meteorite that crashes into the Arctic Ocean. More frequently, aeroplanes are incidental to the story, such as the Lioré et Olivier LeO H-242 in *King Ottokar's Sceptre*, which also features a SIAI-Marchetti SM.73, Stinson R-3S and a Messerschmitt Bf 109!

## National Aerospace Library YouTube Channel

Website [www.aerosociety.com/movies](http://www.aerosociety.com/movies)



FUNDED BY THE Royal Aeronautical Society, the Farnborough-based National Aerospace Library (NAL) has launched an online heritage film collection available through the NAL channel on the YouTube platform. Don't worry — it's extremely easy (and completely free) to use. Just enter the website address [www.aerosociety.com/movies](http://www.aerosociety.com/movies) into your internet browser and you'll be taken instantly to the opening page containing a number of playlists, based around various themes — including the Classic Lecture Series of talks given by some very distinguished speakers (Sir Peter Masefield on the Brabazon Committee, for example) for the RAeS down the years. Another playlist contains three vintage films on Miles Aircraft, highlighting the Messenger, Aerovan and Libellula; two others focus on air transport and helicopter operations. Films from the archive date back to 1927 and have been digitalised for online viewing — many have not been available to the public for decades. The plan is to continue to add material regularly, and viewers may subscribe to be alerted whenever new content is uploaded. To subscribe is free, but not compulsory. With the vicissitudes of the global pandemic making it difficult, if not impossible, to enjoy aviation in the way we might have been able to pre-Covid, this is an excellent way to continue seeing classic aviation in motion — but beware, you can lose hours once you've started! **NS**

Tintin books were frequently re-drafted to bring them up to date. A good example of this is *The Black Island*. The first (black-and-white) edition, published in 1938, featured a Heinkel He 70, Dewoitine D.27, Bristol Scout, SM.73 and a Howard DGA-4. In the 1965 colour version, the He 70 was replaced by a Percival Prentice, the Dewoitine by a Cessna 150, the Bristol Scout by a Tiger Moth, the DGA-4 by a Chipmunk and the SM.73 by a Hawker Siddeley Trident.

The book features all the various aircraft with images from the relevant Tintin volumes, contemporary photographs from Hergé's collection which he employed as a basis for his drawings, and a brief table with the characteristics of the aircraft featured. These latter should be treated with caution. For instance, the Spitfire is referred to as the "PR Mk VII", and the Chipmunk is described as being built by Bristol. Blistering barnacles!

Despite these minor irritations the book is a delight. It is not by any means a reference volume, but a book to relish and revel in Hergé's fascination with flight.

**NIGEL DINGLEY**

### ***The Men Who Gave Us Wings: Britain and the Aeroplane 1796–1914***

By Peter Reese; Pen & Sword Aviation, 47 Church Street, Barnsley, S70 2AS; 6¼in x 9¼in (160mm x 236mm); hard-back; 272 pages, illustrated; £25. ISBN 978-1-848848-48-1

ORIGINALLY PUBLISHED in 2014, this is a reprint of Peter Reese's workmanlike history of early aviation in Britain. He has clearly read thoroughly around the subject; there is a lengthy bibliography and copious references, and a decent index. However, most of the references are secondary sources, and this leads to some pitfalls. For example, he quotes one reference which says that Germany had 30 operational

airships at the start of the First World War, and another that says it had 12 (the latter is nearer the truth, if non-rigids are included). There are other errors, especially where he strays from his area of expertise: airship *HMA No 1 "Mayfly"* was not the Royal Navy's only airship when it was destroyed, but rather the only rigid airship.

It is somewhat arbitrary to limit the scope of the book to British developments and to aeroplanes. Airships played a major role in the early history of flight, and even by 1914 it was by no means clear that they were an evolutionary dead end. It is arguably fair enough to discuss only the British developments in the run-up to the First World War, but a more international picture is desirable for the pre-1910 history of flight. He does mention non-British pioneers such as the Wright brothers and Blériot in some detail, but there are omissions; Clément Ader for one. A newcomer to the subject would be better served with a more all-round approach.

A more serious omission, given the central theme of the book, is that there is no mention of the monoplane ban which affected British military aviation before and during the First World War. There are other errors: Skene and Barlow were killed in a Blériot, not a Farman. The index confuses Robert Loraine, the actor and aviator, with another Captain Loraine who was the RFC's first accidental fatality. The book possibly overstates the degree to which the British were behind in aircraft development in 1914: although the RFC was heavily dependent on French types (the RNAS less so), the best British aircraft were as good as any that the French and Germans had, and that includes the B.E.2.

The book is written in a readable, entertaining style that fleshes out the personalities involved, and provides numerous anecdotes. It will provide a good overview of the subject, but for an in-depth understanding it will need to be read in conjunction with other sources.

**ADRIAN ROBERTS**



# BOOKS IN BRIEF

A quick round-up of what else is currently available for the aviation history enthusiast

## AIR WARS BETWEEN ECUADOR AND PERU VOLUME 2: FALSO PAQUISHA!

**Amaru Tincopa**

Helion & Co; ISBN 978-1-913118-70-9; £16.95

FOLLOWING ON from Volume 1 of this series (covering the *Guerra del '41*, as reviewed here in *TAH31*), Peruvian aviation historian Amaru Tincopa tackles the little-known “Fake Paquisha” war between Peru and Ecuador during January–February 1981. In this, Ecuador took control of three Peruvian watchposts in the Condor mountains marking the nations’ borders; it offered the intriguing prospect of combat between the state-of-the-art aircraft types on both sides, including Peru’s Mirages and Ecuador’s Jaguars. While the facts are all there, the text could use a good edit for English, but it’s excellent stuff nevertheless. **NS**



## THE BATTLE OF BRITAIN POCKET MANUAL 1940

**Edited by Chris McNab**

Casemate UK; ISBN 978-1-612008-69-1; £11.99

THIS TIDY LITTLE 5in x 7¼in clothbound hardback “pocket manual” is essentially a collection of contemporary British, German (and some American) official documents, some previously unavailable to the public, relating to the aerial struggle played out over southern England 80 years ago. Reproduced verbatim, the documents are divided into five chapters — *Opposing Forces; The Defence of Great Britain; Air Combat Tactics; Support Services* and *The Changing Battle* — accompanied by an introduction and regular interstices from editor Chris McNab, who does a fine job of providing context. A good and affordable “one-stop shop” for all sorts of useful info on both sides. **NS**



## WRECKS & RELICS

– 27TH EDITION

**Ken Ellis**

Crécy Publishing; ISBN 978-191080-9396; £18.95

FEW BOOKS can legitimately claim on their front covers to be “indispensable”, but the excellent *Wrecks and Relics* definitely is, and this new edition underlines the value of this long-established fixture on the UK aviation publishing scene. In addition to listing all preserved aircraft in museums in the British Isles including the whole of Ireland, it lists those on other sites as well, including gate-guardians, restoration projects, stored and redundant airframes — and even ones on glampsites and at paintballing venues. A potted history is provided for each; and, in all, the 384-pages hardback encompasses more than 5,000 aircraft at 700+ locations. Changes and moves since the last edition are noted; with the Covid-19 cloud still hovering, and manpower at museums under ever-increasing threat, doubtless more are looming. **MO**



## SCHWEINFURT–REGENSBURG 1943

**Marshall L. Michel III**

Osprey Publishing; ISBN 978-1-472838-65-0; £14.99

THE 14th in Osprey’s *Air Campaign* series, this 96-page 7½in x 9¾in softback details the US Eighth Air Force’s missions of August 17, 1943, in which two large bomber forces attacked the Messerschmitt Bf 109 factory at Regensburg and the ballbearing plant at Schweinfurt, and which proved extremely costly to the Americans. The author sets out the story in a logical, readable manner and some editing quibbles notwithstanding — we’d expect the use of “defence” and “aircraft” rather than “defense” and “airplane” from a British publisher — provides a highly satisfying account of the action, aided by numerous photographs, maps and illustrations. **NS**



## BRITISH AIRFIELDS OF THE SECOND WORLD WAR

**Stuart Hadaway**

Shire Publications; ISBN 978-1-784423-95-7; £8.99

WHEN THE SECOND World War broke out in 1939, there were 158 RAF airfields across the UK; by 1945 that number had more than tripled to 490 — plus 133 USAAF bases — the vast majority of which had been built by the Air Ministry. In this copiously illustrated 5¼in x 8½in softback, the RAF Air Historical Branch’s Stuart Hadaway provides an authoritative and fascinating insight into how they were built and what wartime life was like on them. **NS**



## AIRLIFT TO THE TOP OF THE WORLD

**Guy Holroyd**

Linden Hill; ISBN 978-1-7352140-0-9; US\$26

A MAIDEN BOOK venture for New York State-based modelling-supplies company Linden Hill, this 52-page landscape-format A4 softback describes the RAF’s part in the 1951–54 British North Greenland Expedition — the UK’s first publicly-funded polar expedition in almost four decades. It saw Sunderlands, Hastings and airborne-lifeboat-equipped Lancasters deployed in support of a joint scientific/military push to within 800 miles of the North Pole, in extreme conditions. This slim book tells the full story of this *Boys’ Own*-style adventure for the first time. **MO**



# Lost & Found

**PHILIP JARRETT** explores the lesser-known corners of aviation history, discovering little-known images and rediscovering long-lost details of aircraft, people and events. This time he asks for help in identifying a pair of Sopwith 1½-Strutters and a French aviator

**I**T IS AN amazing fact that more Sopwith 1½-Strutters were built in France than in the type's country of origin. Furthermore, more than 20 of the French-built examples went on to that country's civil register in the early inter-war years, often serving as joy-riding aircraft or to carry parachutists aloft.

The first one depicted here, a 1.B2 possibly registered F-ABDV, is seen with its pilot, a Monsieur Desmoulins. A search in a listing of French aviators in the hope of identifying him left me with three likely candidates. These are: Camille Desmoulins (licence No 7277 gained on a Voisin on September 8, 1917); Coustand

Desmoulins (licence No 9166 gained on April 16, 1918); and Octave Desmoulins (licence No 17344 gained on October 1, 1919). Can anyone say which is the correct Desmoulins?

The second picture, acquired from a German dealer, shows another French-built example, completely devoid of any visible markings, at an undetermined location. There appears to be a large airship shed in the background, and there is an intriguing hump on top of the aircraft's forward fuselage, immediately aft of the engine cowling. Perhaps a reader can identify the location, and even explain the purpose of the hump?



**RIGHT** A French postcard bearing the work of photographer "Maximin", showing "L'Aviateur Desmoulins sur avion Sopwith", a 1.B2 variant, which has the name "Wolol" or "Woloh" crudely inscribed below the cockpit. Can anyone identify l'aviateur for certain?

**BELOW** A remarkably sharp photograph of an anonymous French-built 1½-Strutter at an unknown location, with an airship shed in the background and a hangar on the right. And what's the hump on its nose for? Any clues to the Editor, please!



# FROM REJECT TO ROCKETSHIP



## THE LIFE AND TIMES OF HAWKER P.1040 VP401

In the exploratory post-war years of the British aircraft industry, first prototypes, especially jets, were often regarded as “proof of concept” vehicles only, of little use once the first flight and testing programme was over. **MATTHEW WILLIS** celebrates one jet prototype that went on to enjoy two more leases of life, first pounding pylons and then testing rockets





**F**IRST PROTOTYPES CAN have short careers. In many cases, as soon as aircraft more representative of production machines appear, the first example's role is essentially over. In other cases, new uses are found for the first machine which can lead to a new lease of life. The first Fairey Fulmar, for example, was still earning its keep as a "working" aeroplane long after the last production machines were scrapped. It is into this latter category that Hawker Sea Hawk — properly the Hawker N.7/46 — VP401 falls, even though it only existed for around five years. This machine had three distinct careers, all brief, but all noteworthy in their way.

## A NEW JET FIGHTER

The design that later became the Sea Hawk was initiated in 1944, when details of a new Rolls-Royce turbine engine were made available to Hawker Aircraft Ltd. The company started by modifying its latest piston-engined fighter — the aircraft that would become the Fury — which the previous year had been successfully tendered to Specification F.2/43 for a lightweight fighter. A process of evolving this design effectively led to all the Fury elements being developed beyond recognition. For example, the relatively thick wing, with curved leading and trailing edge, was replaced with a thinner aerofoil of just 9.5 per cent thickness/chord ratio at the root, with straight tapered edges. This resulted in a new type, accordingly designated as the P.1040.

The unique feature of this machine was in the arrangement of the jetpipe. Preceding single-jet fighter designs such as the Supermarine E.10/44 (developed into the Attacker) and Gloster E.1/44 carried the jet exhaust directly through the fuselage to exit at the tail. Hawker, however, considered that this arrangement led to a loss of thrust from the required long jetpipe, and took up a lot of space in the fuselage. The company worked with Rolls-Royce to develop a special bifurcated jetpipe exiting on either side of the fuselage. This both minimised loss of thrust and significantly increased the volume of internal fuel that could be carried, mitigating one of the main problems with first-generation jet fighters — a chronic lack of range.

The Air Ministry initially encouraged Hawker, and Sir Wilfrid Freeman is reported to have told the company to "go right ahead" in January 1945. Design work began that March, with considerable attention focused on the air intakes, and in October the first metal was cut



**ABOVE** The first prototype Hawker P.1040, what would become VP401, under construction at Hawker's Kingston factory, in late 1946. The forward and rear sections of fuselage, built as individual sub-assemblies, have been skinned and joined. The author described the process of building the P.1040 prototypes in *How To Build A Sea Hawk* in TAH20.

at Hawker's experimental shop at its factory at Kingston-upon-Thames, on the aircraft that would later become VP401.

Two months later, however, the company was told that the Air Ministry was no longer interested. The reason given was that the aircraft showed insufficient improvement over the Gloster Meteor, which somewhat went against recent assessments which rated the Hawker design considerably in advance of existing types. It looked as though Hawker's work was going to be wasted, but the Admiralty saw more promise — being particularly attracted by the potential of the Hawker's endurance thanks to the greater internal fuel capacity its layout allowed.

The Naval Staff drew up a draft requirement in April 1946, written around the Hawker proposal, and an official order was placed for three prototypes the following month. Several sources state that two navalised prototypes were actually ordered in February, although it was common for formal contracts to follow orders after work had begun. It would be at this point that the serials were allocated, with the second and third machines to be VP413 and VP422. The first aircraft, VP401, was not navalised in any way, lacking the folding wings and arrestor gear of operational machines. Its role in the programme would be solely focused on flight characteristics.

**OPPOSITE PAGE** A characteristically splendid photograph by Charles E. Brown of P.1040 VP401 in its silver finish leaving a fuel vapour trail above the clouds in the late summer of 1947. Compared to its propeller-driven predecessors, the P.1040 was the epitome of the modern fighter. PHILIP JARRETT COLLECTION / COLOUR BY RICHARD JAMES MOLLOY

*The shape of things to come — VP401 as first flown in September 1947 at Boscombe Down, with the original rectangular exhaust fairings and a nose-attitude reference mast ahead of the cockpit. Interestingly, in its issue of September 5, 1947, British weekly aviation magazine The Aeroplane referred to the P.1040 as the "Zephyr", although it offered a correction the following week stating that it was in fact not so named.*



**BELOW** A rear view of VP401 at Boscombe Down in September 1947. The first prototype was originally fitted with a Rolls-Royce Nene I centrifugal-flow turbojet engine of 4,500lb-thrust, later replaced by a more powerful Nene II of 5,000lb-thrust. The mainwheels, attached to the centre-section stub wings, retracted neatly into the fuselage.



**BELOW** Hawker test pilot Trevor "Wimpy" Wade in the cockpit of VP401 at the Hawker factory at Langley. For its first flight on September 2, 1947, VP401 was sent to Boscombe Down, which had a more suitable runway than Langley's grass. Three days after its maiden flight the aircraft went to Farnborough, for the continuation of trials.

PHILIP JARRETT COLLECTION





**ABOVE** Showing off its extremely clean lines, VP401 was captured in this magnificent air-to-air study by Hawker's regular photographer Cyril Peckham in 1948 or 1949, with Wade at the controls. Shown to good effect in this head-on view are the type's air intakes and relatively thin outer wing sections, with a thickness-to-chord ratio of 0.095:1.

This made sense, as Hawker could continue work on the machine without needing to make time-consuming large-scale changes to it, in the knowledge that fully navalised prototypes would be ready when the aircraft was in a position to begin its deck-landing trials.

## THE N.7/46

The draft specification was formalised as Specification N.7/46 on October 8, 1946, two days before a mock-up conference was held, helpfully allowing the finalised requirement to be considered when the mock-up was inspected. The Specification was issued "to cover the design and construction of a prototype jet-propelled fighter aircraft for operation from the carriers of the Royal Navy in any part of the world". Although the Specification was for a prototype only, the aircraft was to be "designed to be suitable for economic production of 600 aircraft at a maximum rate of 30 per month". A Rolls-Royce Nene turbojet engine was specified.

An appendix set out the Navy's requirements for a "Long Range Strike Support Day Fighter" that the prototype was to lead to. This indicated that although it was not required that the aircraft be pressurised, provision was to be made for pressurisation to be fitted at a later date. It asked for best performance to be available between sea level and 15,000ft (4,600m), with the highest possible manoeuvrability, "particularly in the rolling plane". Armament was to consist of four 20mm cannon, although two 30mm cannon may be required at a later date.

At the mock-up conference it was noted that changes in the equipment required between draft and final versions of the Specification meant that the prototypes would "not meet all requirements completely but only as far

as practicable". A list of specific changes and details was drawn up over two days of inspection of the mock-up, few of which would be incorporated into the first prototype. Most, to expedite test flying, would not. Notably, the Admiralty representatives felt that the four-cannon armament could be improved from a maintenance perspective, and that "loading and cocking and removal of guns" in the installation presented "would impose severe restrictions for deck operation".

As the N.7/46 was taking shape, the science of "pilot escape" was advancing. The Hawker design was to be an "early adopter" of the new Martin-Baker ejection-seat, which had been tested with a human occupant only four months before the mock-up conference. The "fully automatic" ejection system, which would jettison the canopy when the pilot triggered the ejection-seat, was not yet available and initially, "for expediency", it had been proposed that VP401 be fitted with a non-automatic seat, requiring the pilot to jettison the canopy before firing the seat. The discussions at the mock-up conference decided the first prototype should, however, have the same fully automatic system as all aircraft, "since the pilot would probably not be able to operate the 'blind' at high airspeeds with the hood released". This and other changes instigated at the conference probably delayed VP401's completion. In any event, a "Type Data Sheet" for the as-yet-unnamed fighter from November 1946 notes: "First prototype is expected to fly in Feb 1947", with the date crossed out and replaced with "end of April", which is itself crossed out and replaced with "flew 2nd September".

A more significant cause of delay, however, was the bitterly cold winter of 1946–47. Heavy





**ABOVE** Another of Cyril Peckham's air-to-air portraits, from the same series as that on the previous page, showing the distinctive modified "pen-nib" exhaust fairings aft of the wing's trailing edge. The original highly curved canopy, however, which Wade complained had a tendency to distort the pilot's view forward, is still fitted.

snowfalls in January and February 1947 blocked roads and railways and prevented the transport of coal to power stations. Hawker had no choice but to shut down its factories for weeks, leaving the incomplete airframe of VP401 sitting in a darkened, silent shop during February 10–28, and at a lower priority when work resumed.

Before work on VP401 in Hawker's experimental aircraft shop temporarily ceased, however, construction of the second prototype, VP413, had begun. A photograph of VP401 with the fuselage-skin plating largely in place and the forward section joined to the detachable rear fuselage — the two halves were brought together on the experimental shop floor in November 1946 — shows a second airframe in the background in the early stages of construction, with frames in jigs.

As well as its lack of navalisation, VP401 lacked most service equipment. Francis K. Mason's *Hawker Aircraft Since 1920* (Putnam Aeronautical Books, Third Revised Edition, 1991) states that in May 1946, "it was decided that the first [prototype], while being aerodynamically representative of the naval fighter, would not feature armament or other operational equipment". However, photographs of the airframe under construction show the cut-outs in the frames and bulkheads needed to install four Hispano cannon, with guns placed *in situ*, probably to indicate how the installation would work on operational aircraft. Other than this, it does not appear that guns or associated equipment were ever fitted to VP401, as every known photograph of the completed aircraft shows the panel where the gun-blast tubes would normally emerge simply plated over.

The prototype was completed at Langley in

the summer of 1947, having been transferred from Kingston for final assembly. Ground tests and taxiing trials took place at Langley in August, and the aircraft made its first flight from Boscombe Down on September 2 that year — this site probably being thought more suitable than Langley's short grass runway — with Hawker's chief test pilot Bill Humble at the controls. These flights proved the basic soundness and performance of the design, but also highlighted areas where the "cutting edge" had led the design team into unknown territory. Most urgent of these was a worrying vibration around the rear fuselage and tail.

## IRONING OUT PROBLEMS

As a result, VP401 was transferred again, after only three days, this time to the Royal Aircraft Establishment (RAE) at Farnborough, where its flight trials continued with the assistance of RAE test pilot Lt Eric "Winkle" Brown, whom Humble had asked to give his opinions on the vibration. Airflow around the wing-root/fuselage junction was found to be breaking away and interacting with the jet exhaust, and redesign of this area resulted in the Sea Hawk's distinctive "pen nib" fairings, which kept the two areas of flow separate.

Tail buffeting at high speed and "snaking" (an oscillation in yaw that does not naturally damp out easily) when engine r.p.m. was changed were traced to turbulence caused by interference at the intersection of the fin and tailplane. Brown once again helped identify the source of the problem — and, reassuringly for Hawker, noted that the elevator vibration was not the sign of runaway flutter. Changes were made to the elevator mass-balances, which helped, although



**ABOVE** Sporting the revised canopy, with a flat windscreen on the forward section, VP401 is seen here at Langley for its first public display on August 24, 1948. During it, according to *The Aeroplane*, Trevor Wade “did full justice to the occasion and showed the paces of his mount in one of the ablest displays we have seen for some time”.

the problems were eventually solved with the addition of an “acorn” or “bullet” fairing at the fin/tailplane junction. It seems VP401 was not fitted with this device during the Sea Hawk trials programme, probably because the vibrations were felt to be irritating but not immediately dangerous. The prototype only received the fairing during a later rebuild. The only other visible alteration made during this period was to change the original highly curved one-piece windscreen for a more conventional three-piece unit with a flat front.

The compromised nature of VP401 meant that its role in the Sea Hawk programme, while vital, was essentially limited. Once the handling characteristics throughout the performance envelope had been assessed and modifications to address early issues tried out, its usefulness was largely at an end. When the more representative prototypes arrived — VP413, which flew a year and a day after VP401, on September 3, 1948, and VP422, just over another year later, on October 17, 1949 — they took on the lion’s

share of development and trials work. Hawker recognised, however, that there was still plenty of life left in VP401.

## A RACING MOUNT

The UK’s National Air Races were to take place in July 1949, restarting the traditional annual event that had run from 1922 until 1938; the 1939 event had been cancelled owing to the likely prospect of war. As with the Olympic Games of the previous year, the location chosen to resume the curtailed event was the one where it would have been held, had it not been for the war: in this case, Elmdon Airport in Birmingham.

The 1949 races introduced an event which immediately drew Hawker’s interest; the SBAC Cup was, for that year, to be solely for jet aircraft. It was billed as “the world’s fastest race”, according to *Flight* magazine. Hawker entered VP401 for both this and the Kemsley Challenge Trophy, another race for high-performance aircraft (but also including piston-engined machines), and thus the aircraft began

**BELOW** Sporting red/orange bands around the rear fuselage and racing number “87”, VP401 awaits its next race at Elmdon in July–August 1949. To the left is Blackburn Firebrand EK621, which raced against VP401 for the Kemsley Challenge Trophy, and to the right, D.H.108 VW120, which lost out to VP401 in the SBAC Challenge Cup.

AUTHOR’S COLLECTION





**ABOVE** Another photograph of VP401 at Elmdon, this time refuelling in front of D.H.103 Hornet PX386, which was to compete against VP401 in the Kemsley Challenge Trophy race — which the N.7/46 won, piloted by Neville Duke. With the introduction of jets, the UK's National Air Races truly represented the "fastest racetrack in the world".

its second career as a racer. It seems that the only modifications made for this purpose were the application of the racing number "87" in large black characters on the nose and tail, and a red-and-orange band around the rear fuselage. The organisers had requested different combinations of coloured bands to be applied to most aircraft to help the judges easily distinguish individual aircraft, especially those travelling quickly; average speeds of the fastest aircraft were, after all, around double that of when the last such race took place.

It was not just Hawker that saw the SBAC Cup as an opportunity to show off the latest technology. The third D.H.108 Swallow, VW120, was entered by de Havilland; although two years old by then, its swept wings and lack of tailplane were still very much on the cutting edge, and the company also fielded Vampire Mk 3 VV190 with an uprated Goblin 4 engine. Vickers-Supermarine put forward its Type 510, a swept-wing development of the Attacker and Hawker also hoped to enter its P.1052, a swept-wing development of the Sea Hawk; but, as it turned out, neither was ready. As it was, then, the Hawker P.1040 (as the N.7/46 was designated by the company) lined up against two slightly older but proven competitors, one of which, the D.H.108, had taken the 100km closed-circuit world speed record the previous year.

Hawker test pilot Neville Duke was to pilot VP401 during the Kemsley Challenge on Saturday July 30, before handing over to Hawker's chief test pilot Sqn Ldr Trevor S. "Wimpy" Wade for the SBAC Cup race, to be held two days later. The course was roughly square, with turning pylons at the airport, Coleshill, Corley and Knowle. The weather on

the weekend of the races could best be described as mediocre, but the event still generated large excited crowds.

## VICTORY!

Each race was run by calculating each aircraft's handicap and setting them off at different times so that, in theory, they would all arrive at the finish at roughly the same time. Whichever aircraft crossed the line first, therefore, was the winner. The format guaranteed close finishes, even if the races could be a little confusing before the competitors came together. In the Kemsley Challenge, the slowest piston-engined aircraft were on their second lap before the jets even took off, and, as *Flight's* correspondent remarked, "the jets seemed to be appearing at all kinds of odd moments". Duke, in VP401, was "scratch man", the last to take off, as the D.H.108 was not taking part in this event. His flying was evidently impressive, described in one report as "magnificent", and he completed one lap at an astonishing 562.569 m.p.h. (907km/h).

As the competitors — a Blackburn Firebrand, Hawker Sea Fury, de Havilland Hornet, two Spitfires and the two jets (VP401 and John Cunningham's Vampire Mk 3) — bunched on the last lap, Duke nipped inside Cunningham to take the lead, and completed the course at an average speed of 508 m.p.h. (818km/h).

On the day of the SBAC race the weather worsened, but after a lengthy delay a slightly clearer patch emerged and the event could begin. John Cunningham took off first, in the "souped-up" Vampire, with Wade beginning his take-off run in VP401 some 47sec later, John Derry in the D.H.108 following just 16sec after Wade. This led to a close and exciting race, with *Flight*





**LEFT** A signed photograph of Neville Duke in the late 1940s, standing astride a Sea Fury, which along with the Tempest, was a type he flew frequently while seconded from the RAF as a production test pilot during 1945–46. Duke succeeded Trevor Wade as Hawker's chief test pilot when Wade was killed flying the Hawker P.1081 in April 1951. TAH ARCHIVE

remarking of VP401 that “the ‘1040 cornered at some formidable g-loading, screening itself in shuddering, spanwise vapour haze and evoking gasps of astonishment and, truth to tell, apprehension”. As the three jets barrelled towards the finish line from the Coleshill turn on the last of four laps, the crowd could see that Wade had the lead narrowly over Cunningham, Derry following a little further back. As the D.H.108 crossed the line, Wade celebrated with a “victory roll”. He had completed the course at an average speed of 510 m.p.h. (821km/h), thus confirming the “world’s fastest race” moniker — although Wade’s fastest lap was actually 0.002 m.p.h. slower than Duke’s best in the Kemsley Challenge, the latter being the fastest racing lap completed to that date in the UK,

and probably the world. By contrast, Derry’s D.H.108 had averaged 488 m.p.h. (785km/h) and Cunningham’s Vampire 470 m.p.h. (756km/h).

The races during July–August 1949 were the last hurrah of VP401 as a P.1040. The aircraft had already had a new use assigned after its role in the N.7/46 programme. It was only around this time that a contract for production aircraft was confirmed and the name Sea Hawk conferred — a name that was, properly speaking, never applied to this particular aircraft. With VP413 well into its career and VP422 shortly to be available, VP401 was to become a testbed for a rocket-powered interceptor. The Hawker designation P.1072 was allocated.

## A NEW RESEARCH ROLE

The poor acceleration of early jet engines prompted a great deal of interest in rocket motors in the late 1940s. Such powerplants were compact and could provide unparalleled top speed and climb rate, as demonstrated by the Messerschmitt Me 163 Komet towards the end of the Second World War. The idea of a rocket-powered P.1040 had been mooted as early as 1945, with the designations P.1046 and P.1047 allocated to straight- and swept-wing versions respectively, but the idea was not proceeded with until 1947, when Armstrong Siddeley began the development of a suitable motor; something that Hawker, as a fellow member of the Hawker Siddeley Group, would have been aware of from the outset. At first an additional prototype was to be built, but the timing of

**ABOVE** With the fitting of an Armstrong Siddeley Snarler rocket motor in its extreme tail in the early summer of 1950, VP401 became the P.1072 experimental research aircraft. The Nene engine remained largely unaffected, but the entire fuel system was revised, with the aircraft’s original 395gal turbojet fuel load reduced to 175gal.

TAH ARCHIVE





**LEFT** VP401 has its Snarler motor refuelled, the liquid oxygen vapourising on contact with the air. The Snarler's inspection panels have been removed, as has the fairing over the external pipework channelling fuel and propellant from the tanks located forward of the jet engine along the underside of the fuselage.

**BELOW** The business end of the P.1072 — VP401 following modification to P.1072 specification, showing the combustion chamber of the Snarler. Owing to modifications to the tail to accommodate the rocket motor, the rudder lost some area at the bottom.

the Sea Hawk programme meant that VP401 would be available from the autumn of 1949. The Snarler rocket used methanol/water and liquid oxygen for fuel and was expected to give a thrust of 2,000lb (907kg) — the same as a Rolls-Royce Derwent I jet engine but at a quarter of the weight and a fraction of the size. The Snarler was the first British liquid-fuelled rocket to fly (the hydrogen-peroxide rocket developed for the RAE-Vickers Transonic Research Rocket flew in 1948 but, being based on German Walter designs, could not be regarded as a solely British rocket). The Snarler was technically throttleable, although initially it had a simple two-position switch to give part or full power.

Intended by Armstrong Siddeley to be a platform for the development of rocket motors rather than for wider use in its own right, the Snarler was not self-contained, needing an external source of power to run its fuel pumps. In the case of the P.1072, this would be the Nene jet. Armstrong Siddeley noted that "for a purely rocket-propelled aircraft, further development is clearly necessary. The present Snarler can, however, be applied to a jet-engined aircraft to increase its rate of climb and manoeuvrability at extreme altitudes".

The P.1040 was particularly suitable for the



AUTHOR'S COLLECTION

Snarler installation, as its split jetpipe left the tail free. The rocket motor was installed in the extreme tail of the fuselage, requiring slight modification of the rudder, which had to have the lower part removed, and it was at this point that an acorn fairing was fitted at VP401's fin/tailplane junction. Interior modifications were more extensive, with the rocket fuel and propellant tanks installed fore and aft of the engine, displacing some of the jet engine's fuel and requiring pipework to be routed along the

**BELOW** The first take-off of the P.1072 under rocket power, from Armstrong Siddeley's airfield at Bitteswell on November 20, 1950, with Wade at the controls. The forward fuselage housed 75gal of liquid oxygen in a spherical tank, while aft of the rear paraffin tank was another tank carrying 120gal of water-methanol for the rocket motor.

TAH ARCHIVE





underside of the fuselage. Armstrong Siddeley sent a complete motor to Hawker for installation in June 1950. This proved successful and VP401 was flown to Bitteswell, Armstrong Siddeley's airfield, on November 16 (under Nene power alone). A series of test-firings on the ground was completed over the next four days, before "Wimpy" Wade took off and climbed through low cloud to perform the first test of the Snarler in the air. The cloud was so thick that observers on the ground could only faintly hear the aircraft, so it was not clear that Wade had been able to light the rocket successfully until the P.1072 appeared below the cloud at high speed and performed a "victory roll".

Everything had gone according to plan, despite a relatively narrow set of parameters that had to be maintained. The rocket could only be fired while the aircraft was climbing, to prevent it approaching the airframe's  $V_{ne}$  (never-exceed speed). The rocket could run for 2min 45sec on its available fuel, meaning that, in theory, the P.1072 could reach 50,000ft (15,200m)  $3\frac{1}{2}$ min after the pilot released the brakes. The lack of pressurisation, however, meant that the aircraft could not safely exceed 40,000ft (12,200m). The pilot, therefore, had to take extreme care, while everything happened extremely quickly during a rocket-powered flight. Between the first and last flights, VP401's finish changed from bare metal to all-over white.

## THE FINAL CURTAIN

Six rocket-powered flights were completed, piloting duties shared between Wade and Duke, between November 16, 1950, and January 19, 1951. On the last of these, the Snarler suffered a small explosion when fuel remaining in the combustion chamber ignited as the motor was restarted. The damage to VP401 was relatively slight, however, and was repaired within a month, but the programme was curtailed and

**ABOVE** *The final curtain — VP401's last major role was as part of the static display at the SBAC Show at Farnborough in September 1951. The P.1072 was presented by Armstrong Siddeley Motors rather than Hawker, although the relationship between the two manufacturers was displayed on the aircraft in the form of a Hawker Siddeley Group emblem on the nose.*

VP401 does not seem to have flown again — certainly not with the rocket lit.

The progenitor of the Sea Hawk did play one last role, as part of the static display at the SBAC show at Farnborough in September 1951. The aircraft was exhibited by Armstrong Siddeley in pristine white paint with a large Hawker Siddeley Group emblem on the nose.

Thereafter VP401 fades from view and it is likely the aircraft was scrapped some time in 1953. It was a sad but all too typical end for an important aircraft, despite its having blazed trails, won races and set records.



## HAWKER P.1072 DATA

**Powerplant** 1 x Rolls-Royce Nene RN.2 turbojet engine of 5,000lb-static thrust + 1 x Armstrong Siddeley Snarler ASSn.1 liquid-fuel rocket motor

### Dimensions

Span	36ft 6in	(11.13m)
Length	37ft 7in	(11.46m)
Height	8ft 9in	(2.67m)
Wing area	256ft <sup>2</sup>	(23.78m <sup>2</sup> )

### Weights

Empty	11,050lb	(5,012kg)
Loaded	14,050lb	(6,373kg)

### Performance

Maximum speed	
at sea level	581 m.p.h. (935km/h)
at 36,000ft (11,000m)	Mach 0.82
Climb to 35,000ft (10,700m)	10min 30sec
Service ceiling	44,500ft (13,600m)
Endurance of rocket	2min 45sec



*New customers visiting the petrol station on the A491 outside Elgin get more “Jet” than perhaps they were anticipating, when confronted by Buccaneer XW530 close to the station forecourt. To find it on Google Earth enter the co-ordinates 57°39'46.8" N 3°18'43.8" W.*



PHOTOGRAPHS BY THE AUTHOR

# OFF THE BEATEN TRACK

*Ever turned a corner to find something unexpected? The Aviation Historian's intrepid aeronautical explorer **PETER DAVISON** investigates the stories behind the oddities that turn up in the most unusual places . . .*

**D**O FOLDING WINGS aid social distancing in hangar decks? A question probably not within the design criteria for the famous airframe seen here. All Blackburn/Hawker Siddeley Buccaneers were built at Brough in Yorkshire from 1958, before being towed to Holme-on-Spalding-Moor for flight testing — an experience repeated circa 2002 when, having retired from service with No 12 Sqn at RAF Lossiemouth in Scotland, this example, XW530, was again towed down the A941 to the Buccaneer Service Station, a Jet petrol station on the northern outskirts of Elgin, Morayshire.

This aircraft celebrates its 50th birthday in 2020 following extended service after its proposed retirement date, during which it excelled in the Gulf War of 1990–91. Reportedly, during *Red Flag* operations from Nellis AFB in Nevada its low-level abilities astounded the pilots of more modern types, who tracked it from the sandtrail it left rather than the aircraft itself.

Parked on a well-kept area just short of the station's forecourt, XW530 is adorned with a “Sky Pirates” badge, the distinctive fox's mask emblem of No 12 Sqn (motto “Leads the Field”) on the fuselage and, possibly uniquely, shark's-mouth markings on its slipper tanks.



**ABOVE** Fill 'er up! Buccaneer XW530 was one of 26 delivered between January 1970 and March 1973, and served with Nos 15, 16 and 208 Sqns during its RAF career, before serving with No 12 Sqn in the Gulf War.



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RALPH AHLQUIST

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**UN Goonies in Congo** *Leif Hellström details the operations of the multi-national United Nations' Douglas C-47 unit established in Congo in the wake of the nation's independence*

**Collapse of an Icon** *In an echo of its current travails, Rolls-Royce faced serious financial woes 50 years ago; Prof Keith Hayward FRAeS examines the company's 1971 bailout*

**Persian Jumbos** *Iranian aviation historian Babak Taghvaei chronicles the career of the Boeing 747 in service with the Iranian military as a tanker and freighter*



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